

PULMONARY TUBERCULOSIS

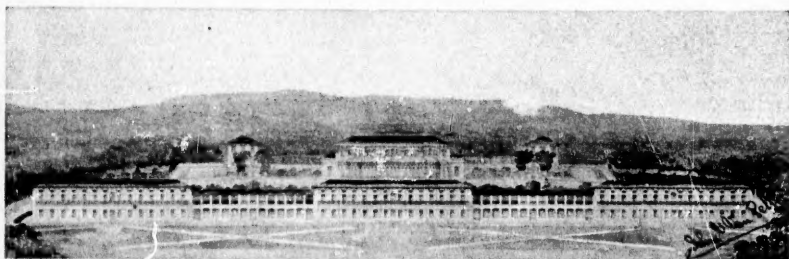
ITS MODERN PROPHYLAXIS
AND THE
TREATMENT IN SPECIAL INSTITUTIONS AND AT HOME

ALVARENGA PRIZE ESSAY OF THE COLLEGE OF PHYSICIANS
OF PHILADELPHIA FOR THE YEAR 1898
REVISED AND ENLARGED

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With Descriptions and Illustrations

OF THE

MOST IMPORTANT SANATORIA OF EUROPE, THE UNITED STATES, AND CANADA
LONDON

H. K. LEE & SONS, 6 JIVR STREET, W.C.

PHILADELPHIA

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PHILADELPHIA

TO THE Hygienists, Statesmen, and Philanthropists AND
THE Many Noble Men and Women INSIDE AND OUTSIDE OF
THE MEDICAL PROFESSION WHO LABOR AND HAVE LABORED
ON BEHALF OF TUBERCULOUS INVALIDS, AND WHO HAVE
HELPED TO DEMONSTRATE THAT CONSUMPTION IS A PRE-
VENTABLE AND CURABLE DISEASE.



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INTRODUCTION.

"It is in the power of man to cause all parasitic diseases to disappear from the world."—*L. Pasteur.*

In this age of rapid printing and in view of the vast and extensive literature daily produced on nearly all subjects in medicine, one should pause and think, and offer good reasons for writing another medical book. Tuberculosis pulmonum is no new disease, and countless are the books and monographs written on its therapeutics. Thus, in offering to the English-speaking medical world, and especially to the medical profession of the United States, to which I have the honor to belong, a new book on the treatment and prevention of pulmonary tuberculosis, I must give weighty reasons for doing so.

First, I may say that I had been encouraged to write this work by a number of my colleagues of the United States and England, who had honored me by reading my French thesis, which procured me the final degree at the faculty of medicine of the University of Paris, in June, 1895. It was entitled "Les Sanatoria: Traitement et Prophylaxie de la Phtisie Pulmonaire." Another encouragement to write down in book form the newer ideas and experiences of what I like to call modern phthisio-therapy I found in the interest which was manifested in my occasional addresses before American medical bodies, and the very kind reception which was accorded to the communications on this subject by the medical press of this country.

But, aside from these encouragements, I felt that there was a need in the United States of spreading the ideas and principles of the modern management of pulmonary tuberculosis—ideas of which I witnessed the best fruits during my stay abroad, especially in Germany and in England.

That the College of Physicians of Philadelphia honored my work with the Alvarenga prize for the year 1898 is, perhaps, the best evidence that I had not been mistaken in thinking that the appearance of a book on the sanitation, hygiene, hospitalization,

and treatment of tuberculous patients of all classes of society might find a just recognition in this country, and help to show that consumption is, indeed, a preventable and curable disease.

I have arranged the Alvarenga prize essay in chapters, more suitable for publication in book form, and reinserted what I had necessarily left out in regard to personal experiments and works previously published.¹ I have also added a short historical chapter containing some interesting data in the history of tuberculosis. But the most considerable addition to this essay, and one which, I trust, will increase the interest in the book, is the description and illustration of some of the most important sanatoria, special hospitals, homes, etc., for the exclusive treatment of consumptives.

My object in presenting this book to the English-speaking medical world is to give the latest thought of the leading European and American hygienists, sanitarians, and physicians on the subject in question, in addition to the results of my own studies and researches in the field of phthisio-therapeutics. These have been gained by years of active practice and actual living among tuberculous patients in hospitals, sanatoria, and American and European health resorts.

The desire to study this disease more thoroughly, with its treatment and prevention, dates back to my early medical career in my former home in Los Angeles, Cal. There, where thousands of consumptives from all over the United States flock in, winter after winter, many of them hopelessly advanced in their disease, others with insufficient means to enable them to be idle long enough to get well, all believing that the glorious climate of Southern California alone would suffice to restore them to health, I was much impressed with the urgent need of a more timely and systematic treatment independent of climate. The perusal of the best American and foreign literature on the subject gave me the first idea of the feasibility of such a method.

But I believe I have especially enriched my experience in regard to the difference between sanatorium and health-resort treatment by an extensive trip, in which I visited, in both continents, some thirty sanatoria, special hospitals, and numerous health resorts consecrated exclusively to the treatment of pulmonary tuberculosis.

¹ As is customary in an essay destined to compete for a prize, any mention of previous works whereby the identity of the author might be revealed must be carefully avoided.

I am lastingly indebted, however, to my distinguished teacher, Herr Geheimrath Dr. Dettweiler, of the Sanatorium Falkenstein, who appointed me his assistant at the conclusion of my studies in Paris. During my service in his institution I believe to have had rare opportunities to study the treatment and management of tuberculous patients in closed establishments. On my return to the United States I began a series of experiments with Marmoreck's antistreptococcic serum in the mixed infection of pulmonary tuberculosis. Professor Hermann M. Biggs, of New York, very kindly placed at my disposal the necessary laboratory and clinical facilities to carry out these experiments, and I desire to express here my gratitude to him for the many courtesies extended to me. I shall speak of these experiments under the heading of Symptomatic Treatment. Since my appointment as Physician to the Lung Department of the New York Throat and Nose Hospital, I have endeavored to study how best to manage and treat our dispensary cases. I consider this subject most important, and have devoted a chapter to it.

As to the results of the treatment of consumption in its various stages by what is commonly known as culture products, tuberculines, etc., I will state what I have seen and learned from the many attempts in this direction, and will give my reasons for preferring the hygienic and dietetic method in either a closed establishment or under careful medical supervision at home. Under the chapter of Aërotherapeutics I will describe my modified method of the use of the pneumatic cabinet, and under Dietetic Treatment I will summarize my recent experiments with tropon.

During my visits to the sanatoria of Europe and the United States I have been everywhere so cordially received that I find it a pleasant duty to thank all these gentlemen (directors and their assistants) once more for their helpfulness in making my *voyage d'étude* so profitable. To compile the statistics on the pathological and clinical evidences of the curability of tuberculosis pulmonum I addressed several hundred letters of inquiry to the leading medical authorities of this country and of Europe. Many honored me by replying in full to my questions, and to all of these I wish to express my gratitude.

In chapter ix I give a list of sanatoria, special hospitals, homes, camps, and colonies existing in various parts of the world devoted to the treatment and care of consumptive patients. I do not claim

that this list is complete. Throughout the civilized world there is now a movement in favor of such institutions. In Germany and Austria these enterprises, best calculated to combat the spread of consumption among the poorer classes, are especially active and enjoy the support of royal personages and of the general government. Hardly a month passes that some German city does not form the project of creating a sanatorium for its consumptive poor.

For information concerning the work done in Austria, England, France, Germany, Italy, etc., since my last visit to those countries and in the countries I could not visit, I am particularly indebted to Professor von Schrötter, of Vienna; Dr. F. R. Walters, of London; Dr. L. H. Petit, of Paris; Dr. Georg Liebe, of Loslau, Germany; Dr. Massalongo, of Verona, Italy; Dr. Klaus Hansen, of Bergen, Norway; Dr. Charles Saugman, of Horsens, Denmark; Madame Paolowskoja, M.D., of St. Petersburg, Russia; Dr. Sandfort Jackson, of Brisbane, Australia.

Lastly, I desire to express my thanks to the many State and city health officers of the United States, who so promptly answered my inquiries about the provision for consumptives in their respective States and cities, and their laws and regulations concerning bovine tuberculosis.

Notwithstanding the care I believe to have exercised in writing this work, it will be far from perfect. There will be errors by omission, and probably also some by commission; for these I ask the indulgence of the reader. The book does not claim the title of a text-book; my earnest and only desire in publishing it is to endeavor to aid the sanitarian and hygienist in their labors to combat the spread of tuberculosis. I would show to the statesman where his duty lies in regard to a disease, which is as much a social as an individual physical affliction, and I hope to indicate to the philanthropist how he may best aid the tuberculous poor and render the greatest service to the community at large. Finally, if the present work will aid some of my fellow-physicians in the management and treatment of that complex disease known as pulmonary tuberculosis, or phthisis pulmonalis, and if through my confrères, the general and family physicians, the public will learn at last that consumption is, indeed, the most preventable and curable of diseases, I shall feel that my labors in the field of modern phthisiotherapy have not been in vain.

16 WEST NINETY-FIFTH STREET, NEW YORK,

May 1, 1899.

PULMONARY TUBERCULOSIS

ERRATA.

On page 64 (tenth line from below), instead of "vigorous measures" read "rigorous measures."

On page 247, where it reads "for two suppositories, to be applied within twenty-four hours," read "for four suppositories, to be applied within forty-eight hours."

On page 252, where it reads "Syrup. limonis, ʒi,"
it should read "Syrup. limonis, ʒj."

And instead of "Aque, q. s. ad ʒiv,"
it should read "Aque, q. s. ad ʒiv."

On page 262 (fourth line) it should read "exacerbations" instead of "exasperations."

On page 272 (thirteenth line), instead of "stage of ulceration" it should read "stage of resolution."

On page 289 (eighth line), instead of "exasperation" it should read "exacerbation."

¹ Ουρος ἢν ἐξ ἀρχῆς θεραπευθῇ ὑγιὴς γίγεται ("if the patient [consumptive] is treated from the beginning, he will get well"), Hippocrates, vol. VII, p. 77. From Littre's French translation.

² Francis Adam's translation of Hippocrates; quoted from Lawrence F. Flick's "The Contagiousness of Phthisis," Philadelphia, 1888.

³ Aretæus, chap. III. "De morborum diuturnorum et acutorum causis, signis et curatione."

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PULMONARY TUBERCULOSIS

CHAPTER I.

INTERESTING DATA IN THE HISTORY OF TUBERCULOSIS.

In this chapter it is not intended to give a complete history of pulmonary tuberculosis,—a disease known to the medical writers of all ages,—but only to put in relief some of the interesting data in connection with the various views that have been expressed on the contagious nature of this disease and the methods of treatment instituted.

Hippocrates, the father of medicine, who lived from 460 to 377 B. C., gave us the first ideas in regard to judicious exercise and the rest cure when he told us (vol. VII, ¶ 49) to have the patient walk if he feels benefited thereby; if not, to rest as much as possible. The hereditary tendency he mentions in his aphorisms (sect. IV, 8). He also believed in the curability of the disease,¹ but we see nowhere any mention of its contagious nature.

Isocrates, who lived about the fifth century before Christ, and who shortly preceded or was a contemporary of Hippocrates, taught that consumption was contagious, but he apparently had few disciples.²

Aræteus,³ supposed to have lived about the year 250 B. C., has

¹ Οἷτος ἂν ἐξ ἀρχῆς θεραπευθῇ ὑγιὲς γίγεται ("if the patient [consumptive] is treated from the beginning, he will get well"), Hippocrates, vol. VII, p. 77. From Littré's French translation.

² Francis Adam's translation of Hippocrates; quoted from Lawrence F. Flick's "The Contagiousness of Phthisis," Philadelphia, 1888.

³ Aræteus, chap. III. "De morborum diuturnorum et acutorum causis, signis et curatione."

given us excellent indications concerning the management of phthisical patients. He prescribed the sea-coast as a residence, and recommended sea voyages and exercises followed by rest and friction of the skin. Milk diet he considered of great importance in the treatment of phthisis.

Celsus (30 B. C.-50 A. D.), the Latin Hippocrates, recommended a life in the country for the weaker tuberculous patients. For the more robust ones he prescribed sea voyages.

Pliny¹ the elder (73-23 B. C.), though his views in medicine were rather empirical, ascribed a most beneficial action to the sun and to the air of pine forests in the treatment of phthisis.

Galen² (131-200 A. D.) used to send his patients to higher altitudes, believing that the drier air of the mountains would heal the ulceration of the lungs. Impure air he considered an important etiological factor. He was probably, next to Isocrates, the first to think of the contagious nature of pulmonary tuberculosis. ("Periculosum prætera est consuescere cum his qui tabe tenentur.")

We must now look to the Arabic school of the tenth century for further light. Avicenna³ (980-1037 A. D.), the most celebrated Arabic physician of that time, believed in the contagious nature of phthisis. He chose mountain climates for his consumptive patients, and he and his pupils recorded the first authentic cures of the disease.⁴

From the eleventh to the sixteenth century little of importance happened in the history of medicine. But with the renaissance medical science also arose from its slumbers. Jacobus Sylvius⁵ (1478-1555), whose real name was Dubois, gave the first exact description of the tubercle, and seems to have had an idea of the close union of scrofula and tuberculosis.

Falloppeo (1523-1562) was evidently a firm believer in climate as a factor in the treatment of phthisis pulmonalis. He was elec-

¹ Littré, "L'histoire de Pline," 1848.

² Boisseau, "Historique de la contagion de la phthisie pulmonaire." Dans le recueil de mémoires de médecine, chirurgie et pharmacie militaires. 3 ser. XXII, mai 1869.

³ Avicenna was born in Persia and his real name was Abou-Iba-Sina-Avicenna. "Arabum medicorum principes canon medicinæ" (Boisseau).

⁴ Manasse, "Die Heilung der Lungentuberkulose," Berlin.

⁵ Predoehl, "Die Geschichte der Tuberkulose," 1888.

tive in the choice of localities, and was guided in this by the temperament and constitution of the patient.

Montano, who lived at the same period (1550), was a strong partizan of the theory of contagion. According to him, one could contract pulmonary tuberculosis by simply walking with naked feet over the expectorations of a patient.

Lazare Rivière, of Montpellier (1589-1655), was also a strong but a more scientific believer in the contagious nature of tuberculosis. He maintained that the transmission of the disease through cohabitation was much more frequently the cause of its development than the hereditary influence.

Van Helmont (1577-1644) believed in mountain and warmer climes for the phthisical invalid, and had the courage to recommend wine as an antipyretic.

Willis, of London (1622-1675), considered the Rivière as especially conducive to the reestablishment of tuberculous invalids, and was in the habit of sending the majority of his patients across the Channel to the southern portion of France during the winter.

Baglivi (1669-1707) deplored the inefficiency of medicinal remedies, and has left us a long description of the different regions particularly favorable for consumptives.

The celebrated Sydenham, of Westminster, London (1624-1689), must have believed in vigorous exercise, for he maintained with certainty to have saved several phthisical patients through horse-back riding.¹

Friedrich Hoffmann (1660-1742) believed in moderately warm and moist atmosphere as best suited to consumptives.

Morgagni (1682-1771) was, perhaps, next to Montano, the greatest believer in the contagiousness of tuberculosis pulmonum. He absolutely refused to perform an autopsy on individuals who had died of consumption.²

Boerhaave (1668-1738), while not speaking in any of his writings of the contagious nature of phthisis, nevertheless made it a rule to send his patients away from the locality where they had contracted the disease.

Van Swieten (1700-1772), Boerhaave's most celebrated pupil,

¹ Dupré de Lisle, "Traité de maladies de la Poitrine connus sous le nom de Phthisis Pulmonaire," Paris, 1769.

² Opera omnia physio-medica, vol. III, de affectione phthisici sive tabe.

followed the teachings of his master in regard to therapeutics, but was a convinced contagionist.

Dupré de Lisle, in his book which appeared in 1769, speaks favorably of horseback riding as a therapeutic means in consumption, but insists that this exercise should be regulated by the physician, and he recommends country life in addition for this class of patients.

In the library of the Surgeon-General of the United States Army¹ is to be found a work, dated London, 1747, entitled "A letter from a physician in the Highlands to his friends in London." The author of this work remains, however, unknown. There we find for the first time the idea expressed that the hygienic and dietetic treatment is the most important factor, and that climate and medicines are only to be considered as more or less precious adjuvants. He quotes cases, of incontestable proof, of patients having been cured in their home climate by judicious diet, careful living, and moderate exercise, without the aid of any medication.

The contagious nature of tuberculosis must have been a popular belief toward the latter part of the eighteenth century. Jeannet de Longrois, in his "*Traité de la pulmonie*,"² tells us of an incident at Nancy, where the municipal authorities had caused the furniture and bedding of a woman who had died of consumption (*femme pulmonique*) to be burned. The woman had contracted the disease from another one with whom she had often shared the same bed.

In Naples, a royal decree, dated September 20, 1782, ordered the isolation of consumptives and the disinfection of their apartments, personal effects, furniture, books, etc., by the aid of vinegar, brandy or lemon-juice, sea-water, or fumigation. Any violation of this law was punished, if the individual was an ordinary mortal, with three years in the galleys. If he happened to be a nobleman, he was sent for the same time to a fortress, and had to pay three hundred ducats. The physician who failed to notify the authorities of the existence of a tuberculous patient was fined three hundred ducats for the first offense. A repetition of the neglect would banish him from the country for ten years. Any one aiding a consumptive to escape was fined and imprisoned for six months.

Portal (1742-1832) wrote that in Spain and Portugal the parents

¹ Index Catalogue, vol. VIII, p. 70.

² Paris, 1781.

of a consumptive were obliged to notify the authorities when the patient had arrived at the last period of the disease. This was done for the purpose of securing the disinfection of the personal effects of the patient. A similar regulation prevailed at that time in Languedoc.¹

Toward the end of the eighteenth and at the commencement of the nineteenth century much discussion concerning the etiology, pathology, and treatment of tuberculosis was carried on in the various centres of medical learning, without bringing forth any new facts concerning this complex disease.

Broussais (1772-1838)² applied his general theory of inflammation also to the lungs, and bled his patients, not only in the first but even in the more advanced stages of the disease. In his chapter "Traitement du deuxième degré de l'inflammation" he says: "J'ai saigné dans ce degré de phlegmasie et les malades sont morts, j'ai épargné leur sang et je n'ai pas été plus heureux; j'ai cependant obtenu plus de guérisons avec la saignée que sans le secours de ce moyen."

Thomas Reid, of London, in his work entitled "An Essay on the Nature and Cure of Phthisis Pulmonalis," which appeared in London in 1785, draws again the line of distinction between tuberculosis and scrofulosis. He considers contagion a rare incident, and only due to cohabitation. He recommends vegetable diet and milk as essential in the treatment of tuberculosis. At times he thought bleeding beneficial, but warns against its excessive use by saying that of all diseases human flesh is heir to, in none has bleeding been so frequently resorted to as in phthisis, and he thought that the old saying "the lancet has killed more people than the lance" was particularly applicable in this case. Reid believed in the curability of tuberculosis of the lungs on the same ground that he believed in the curability of diseases of other viscera.

A most singular opinion was expressed by Cullen, of Edinburgh (1700-1790), in regard to the contagious nature of tuberculosis. He claimed that a warm climate was essential before contagion could take place.

Hufland³ (1781-1827) believed in hereditary influence and a

¹ Straus, "La tuberculose et son bacille," Paris, 1895.

² Broussais, "Histoire de phlegmasie chroniques," 1826.

³ Hufland, "Ueber die Natur, Erkenntniss, und Heilart der Scrophel-Krankheit," Berlin, 1819.

predisposition to the disease, but he disbelieved in the possibility of contagion *per se*. He and his contemporary, the distinguished Schönlein (1793-1864) were, however, strong advocates of climatic treatment.¹ Schönlein particularly thought to have observed immunity from this disease among the people who had lived their entire life in mountainous regions.

One of the most interesting figures in medicine at the beginning of this century, and whose works are of particular interest to phthisio-therapeutists, was doubtlessly René Théophile Hyacinthe Laennec (1781-1826). In pathology he established the unity of all tuberculous diseases, and in clinical work he taught us how to auscultate the diseased chest. He believed in the curability of the disease, but it is difficult to say whether or not he believed tuberculosis to be contagious. The fact remains that he died of the ultimate results brought about by an inoculation during an autopsy on a tuberculous subject. Therapeutically, he ascribed to ocean air the best effects in phthisis. He was so convinced of this that during the latter stage of his disease he had the sea air produced artificially in his bedroom.

At the end of the last century (1791) May endeavored to demonstrate that the dietetic treatment was all that was necessary for a successful issue in the treatment of phthisis pulmonalis. Curchot and Carrière placed their faith in buttermilk and in the grape cure.

One of the next most important events in the history of tuberculosis was Villemin's communication to the Academy of Medicine of Paris on December 5, 1865, wherein he demonstrated the inoculability of tuberculosis and the necessity of classifying this affection under virulent diseases. These experiments have since been verified by many observers, foremost among them Cornet, Cohnheim, Tappeiner, of Germany; Grancher, Cornil, Straus, Verneuil, Chauveau, and Hérard, of France; Williams, Clarke, and Wilson Fox, of England; Welsh, Biggs, Loomis, Prudden, Hodenpyl, and Klebs, of the United States.

On the 24th of March, 1882, Koch announced to the world his memorable discovery of the bacillus tuberculosis—a discovery which shed a new light on tuberculosis as a disease due to a dis-

¹ J. L. Schönlein's "Allgemeine und specielle Pathologie und Therapie."

tinct micro-organism.¹ Of the history of Koch's next most important communication, concerning the tuberculine, made on the 24th of August, 1890, before the International Medical Congress in Berlin, we will speak under the respective chapter, treating of culture products.

In concluding this historical sketch I only desire to add the short, but nevertheless interesting, history of sanatoria for consumptives. Special hospitals for scrofulous and tuberculous diseases were first founded in England. The oldest of all, "The Royal Sea-bathing Infirmary for Scrofula," in Kent County, is still existing. It was founded in 1791. It is for the poor only, and admits all forms of tuberculosis except laryngeal and pulmonary. It has now 220 beds. The next oldest hospital for tuberculosis, and the first exclusively devoted to diseases of the lungs, is the "Royal Hospital for Diseases of the Chest," on City Road, in London, which was founded in 1814. It now accommodates eighty patients. "Brompton Hospital for Consumptives," the most important of the English institutions, was established in 1841, and has now 321 beds. Since then special hospitals have multiplied in England in greater proportion than in any other country. Sanatoria, on the contrary, are still relatively rare in England, and Germany takes the lead in this class of institutions.

Perhaps the earliest effort in sanatorium treatment was inaugurated by Dr. George Bodington, of Sutton Coldfield, Warwickshire, England.² In him we must recognize a predecessor of Brehmer and Dettweiler, for in his "Essay on the Cure of Pulmonary Consumption on Principles Natural, Rational, and Successful" he advocates a generous diet consisting of fresh meats, eggs, farinaceous food, beef-tea, milk, etc., and insists upon fresh air day and night. Concerning the foundation of the first sanatorium for consumptives, in 1839, which very nearly approaches the conception of the German "Heilanstalt" of to-day, we will quote his own words: "I have taken for the purpose a house in every respect adapted, and near to my own residence, for the reception of patients of this class. . . . It is presumed that the advantages to be derived from

¹ Robert Koch, "Die Aetiologie der Tuberkulose," "Berliner klin. Wochenschrift," No. 15, 1882.

² "Dr. George Bodington (1840)," by A. Tucker Wise, M.D. ("New York Med. Journal," vol. LXIX, No. 2).

systematic arrangements with regard to exercise, diet, and general treatment, with the watchfulness daily, nay, almost hourly, over a patient of a medical superintendent, great advantages may be obtained by the consumptive patient treated in this way."

The founder of the first sanatorium in Germany for the exclusive treatment of tuberculosis, and the best-known promulgator of modern phthisio-therapy, was Hermann Brehmer, of Görbersdorf. His thesis for the final degree, published in 1856, is characteristic of his life's work: "Tuberculosis primis in stadiis semper curabilis." But in spite of his efforts he could not get the authorization to



FIG. 1.—DR. HERMANN BREHMER.

open an establishment for the exclusive treatment of tuberculous patients. His democratic ideas were not favorably looked upon by the Prussian government, and only through the powerful influence of his distinguished friends, Humboldt and Schöntein, he received at last, in 1859, the authorization to open his sanatorium. Brehmer's work and example has born good fruits. He died December 22, 1889. Dr. Brehmer was a striking figure: imposing, energetic, with a beautiful head on broad shoulders, and a patriarchal beard. He knew how to inspire his patients with implicit confidence. The photograph which I reproduce here is a splendid likeness of this great physician. Brehmer was most

fortunate in his enterprise, but he was not privileged to enjoy the satisfaction of seeing sanatoria erected all over the world, where his precepts for the treatment of consumption would be eagerly followed. His most distinguished pupil and co-worker, Geheimrath Dr. Dettweiler, has somewhat modified Brehmer's treatment, by instituting more particularly the rest cure. He is still at the head of the celebrated institution at Falkenstein. Dr. Dettweiler is also consulting physician for the first German sanatorium for the consumptive poor at Ruppertshain, which was founded in 1892.

As pioneers in aërotherapy and in the rational treatment of pulmonary tuberculosis, two persons should not be forgotten—Bennet, of Menton, an English physician, himself a consumptive, tried on his own person the effects of a permanent outdoor life, under the guidance of that ingenious and world-famed nurse, Florence Nightingale. Bennet published his treatment of pulmonary phthisis by hygiene, climate, and medicine in Paris, 1874; a book which is still considered a most valuable guide in the treatment of pulmonary tuberculosis.

The history of sanatoria for the poor and for those of moderate means is still the history of the day. Only in recent years have they begun to multiply in various countries. To the United States belongs the credit of having erected the first sanatorium for consumptives among the poorer classes. Some fifteen years ago Dr. E. L. Trudeau, of Saranac Lake, made a personal appeal for contributions in order to erect a cottage sanatorium in the Adirondack Mountains. In 1884 a small cottage and the wing of the intended main building were erected. Each year the institution grew, so that it now has some eighteen separate cottages, and can accommodate nearly one hundred patients. It owes its prosperity mainly to the personal efforts of its founder and his friend, the late Professor Alfred Loomis, of New York, and to the generosity of the public.

As of historical interest in modern phthisio-therapy we must mention the inauguration of the first Bi-annual Congress for the Study of Tuberculosis in Paris, in 1888, under the presidency of Professor Chauveau. Lastly, I desire to note two literary events connected with our subject: In 1893 appeared the first number of that excellent journal, "*La Revue de la Tuberculose*," under the direction of the late Professor Verneuil, with Bouchard, Chauveau, Brouardel, Charcot, Cornil, A. Fournier, J. Grancher, Lanne-

longue, Nozard, Potain, Richet, I. Straus, Tarnier, and L. H. Petit as co-editors. On the 1st of January, 1897, appeared in Berlin, under the direction of Dr. Gotthold Pannwitz, the first issue of that interesting little journal called the "Heilstätten Korrespondenz." It is the organ of the German Central Committee for the Foundation of Sanatoria for the Consumptive Poor, and contains all the latest news appertaining to the subject. Lastly, on February 15, 1898, the first number of "La Tuberculose Infantile" appeared. It is a bright, interesting bi-monthly journal, devoted to tuberculous diseases of childhood; edited under the direction of Drs. Léon Derecq and Georges Petit, of Paris.

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CHAPTER II.

MORTALITY FROM PULMONARY TUBERCULOSIS.

"Μέγιστον δὲ καὶ χαλεπώτατον καὶ πλείους ἔκτεινε τὸ φθινώδες." "The greatest and most dangerous disease, and the one that proved fatal to the greatest number, was consumption."—(Hippocrates, "Epidemics," III, Sec. 3, 13, Adam's translation.)

We see from the above quotation that even at the times of Hippocrates the mortality from pulmonary tuberculosis was already alarmingly great. To-day it is generally conceded that one-seventh of all deaths are due to consumption, and that one-sixth of all mankind is tuberculous.

The following statistical table is the latest I could obtain. It gives the mortality from pulmonary tuberculosis for each thousand individuals living. It appeared in the "Münchener med. Wochenschrift" of January 7, 1896, and seems to be most carefully compiled:

CITIES.	POPULATION.	1894.
FRANCE:		
Le Havre,	116,000	50.3
Rouen,	111,000	45.0
Paris,	2,424,000	41.6
Nancy,	86,000	33.7
Lyon,	431,000	33.6
Reims,	105,000	32.6
Nantes,	122,000	30.1
Roubaix,	115,000	29.7
Lille,	70,000	28.2
Bordeaux,	252,000	25.5
Saint-Etienne,	131,000	23.5
Marseille,	406,000	21.8
Toulouse,	148,000	17.7
Alger,	83,000	16.5
GERMANY:		
Würzburg,	65,000	52.4
Nuremberg,	161,000	39.3
Breslau,	361,000	34.9
Augsburg,	81,000	33.5

CITIES.	POPULATION.	1894.
<i>GERMANY—Continued.</i>		
Munich,	393,000	30.8
Cologne,	309,000	28.2
Frankfort,	201,000	27.2
Elberfeld,	138,000	26.6
Dresden,	316,000	26.0
Altona,	149,000	24.7
Leipzig,	404,000	24.0
Görlitz,	67,000	24.3
Chemnitz,	150,000	22.7
Berlin,	1,703,000	22.3
Hamburg,	604,000	21.1
Lübeck,	69,000	16.1
<i>IN OTHER COUNTRIES:</i>		
Budapest,	552,000	49.3
Vienna,	1,465,000	45.4
St. Petersburg,	954,000	44.3
Moscow,	753,000	42.9
Warsaw,	500,000	25.7
New York,	1,925,000	24.1
Philadelphia,	1,115,000	23.7
Glasgow,	686,000	22.6
Naples,	535,000	21.1
Buenos-Ayres,	580,000	20.7
Manchester,	522,000	19.6
London,	5,300,000	17.3
Chicago,	1,600,000	13.4

For the United States it seems to me of interest to give the statistics of each State, as reproduced in Polk's "Medical and Surgical Register for 1898":

STATE.	TOTAL NUMBER OF DEATHS FROM CONSUMPTION DURING 1890.	DEATH-RATE FROM CONSUMPTION PER 1000 OF POPULATION.	DEATHS FROM CONSUMPTION PER 1000 OF TOTAL DEATHS.
Alabama,	2163	1.43	103.50
Alaska,*			
Arizona,	68	1.14	118.67
Arkansas,	1209	1.07	84.01
California,	2889	2.39	163.19
Colorado,	489	1.18	89.68
Connecticut,	1743	2.34	120.46
Delaware,	476	2.83	153.20
District of Columbia,	827	3.59	138.87
Florida,	377	0.96	90.95
Georgia,	2155	1.17	101.77
Idaho,	36	0.43	46.69
Illinois,	5698	1.49	107.26
Indian Territory,*			

* No reliable mortality statistics are obtainable.

1894.	STATE.	TOTAL NUMBER OF DEATHS FROM CONSUMPTION DURING 1890.	DEATH-RATE FROM CONSUMP- TION PER 1000 OF POPULATION.	DEATHS FROM CONSUMPTION PER 1000 OF TOTAL DEATHS.
30.8	Indiana,	3504	1.60	144.91
28.2	Iowa,	1832	0.96	104.56
27.2	Kansas,	1368	0.96	113.83
26.6	Kentucky,	3538	1.90	148.18
26.0	Louisiana,	1516	1.35	92.70
24.7	Maine,	1477	2.23	147.05
24.0	Maryland,	2315	2.22	128.61
24.3	Massachusetts,	5981	2.67	132.58
22.7	Michigan,	2747	1.31	109.81
22.3	Minnesota,	1532	1.17	98.92
21.1	Mississippi,	1433	1.11	96.18
16.1	Missouri,	3559	1.32	109.72
49.3	Montana,	55	0.42	54.34
45.4	Nebraska,	604	0.57	71.52
44.3	Nevada,	35	0.77	80.65
42.9	New Hampshire,	729	1.93	103.05
25.7	New Jersey,	3388	2.34	112.65
24.1	New York,	14,854	2.47	120.65
23.7	North Carolina,	2212	1.37	112.00
22.6	North Dakota,	167	0.91	97.32
21.1	Ohio,	6393	1.74	128.26
20.7	Oklahoma,	21	0.34	59.66
19.6	Oregon,	305	0.97	118.45
17.3	Pennsylvania,	7689	1.46	104.57
13.4	Rhode Island,	921	2.67	121.84
	South Carolina,	2112	1.83	136.30
	South Dakota,	208	0.63	76.89
	Tennessee,	3637	2.06	152.47
	Texas,	2059	0.92	77.93
	Utah,	62	0.30	29.26
	Vermont,	661	1.99	121.84
	Virginia,	3050	1.84	131.28
	Washington,	278	0.79	103.15
	West Virginia,	1143	1.50	138.13
	Wisconsin,	2015	1.19	107.97
	Wyoming,	18	0.30	43.48

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DEATHS FROM
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Concerning the relative mortality from the various diseases, I give here Professor Fletcher W. Hewes' interesting dial, as it appeared in Cuzner's article in "The Journal of the American Medical Association," of December 17, 1898.

This dial shows the terrible mortality from diseases of the respiratory organs, and especially from pulmonary consumption.

We will learn in chapter VII, on the Care of Consumptives by the Authorities, how much the mortality has already been decreased in these latter years in some of the cities of Europe, thanks to the creation of special hospitals and sanatoria for the poorer classes, and also in a few cities in the United States by the inauguration of

103.50

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a rigorous prophylaxis against the spread of tuberculosis. However, we shall also see how much is yet to be done in the line of

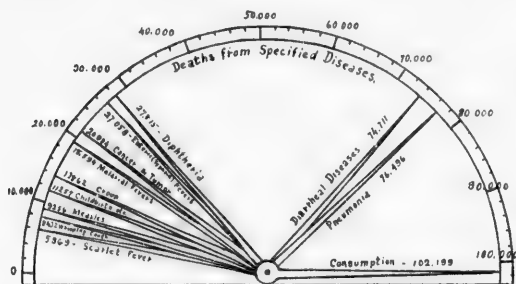


FIG. 2.

prophylaxis and in the creation of special institutions in order to combat the spread of this disease more effectually everywhere.

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CHAPTER III.

PATHOLOGICAL PROOFS OF THE CURABILITY OF PULMONARY TUBERCULOSIS.

The curability of pulmonary tuberculosis in the first and second stage is yet much contested, even by medical men. Among the laity the belief that, the disease once declared to be present, all hope has to be abandoned, is still very prevalent. To convince the patient of the contrary, to instil in him the hope of recovery, to encourage him in his persistent effort to carry out all the details which tend to improve his condition, should constitute an important part of the educational treatment of all consumptives. Doubting physicians should go into the dissecting-room and witness the coroner's post-mortem examinations. They will see many a cicatrized lung lesion in persons who have died from entirely different diseases or from accidents. As early as 1838 Carswell¹ wrote: "Pathological anatomy has perhaps never given more decisive proofs of the curability of a disease than it has given for pulmonary consumption." These words from one of the foremost pathologists of his time may be recalled to doubters as an evidence of how wrong they are in their pessimistic conception of a disease which is eminently curable. By personal inquiry, through letters addressed to the leading pathologists of the world, and by looking up the literature on the subject, I have myself compiled some statistics giving the pathological proofs of the curability of pulmonary tuberculosis, from which I append the table on next page.

Besides those mentioned in the table, Andral, Meckel, Rokitanski, Ulsperger, Virchow, and Werdmüller² have reported cases of healed tuberculous lesions in persons who had died of other than tuberculous diseases. Laennec³ believed in the curability of pulmonary tuberculosis. Curveilhier, in his "Traité d'Ana-

¹ Carswell, "Pathological Anatomy," London, 1838.

² P. Manasse's statistics in his "Heilung der Lungentuberkulose."

³ Laennec, "Traité de l'auscultation médiate." Edition de la Faculté, 1879.

REPORTED BY.	NUMBER OF AUTOPSIES.	NUMBER OF CASES WHERE AUTOPSY REVEALED HEALED PULMONARY TUBERCULOUS LESIONS.
Boudet, of Paris,	135	116
Beaux, of Paris,	166	157
Bennet, of Menton,	73	28
Baudet, of Paris,	197	10
Marsini, of Basel,	228	89
Bollinger, of Munich,	400	69
Heitler, of Vienna,	16,562	789
Chiari, of Prague,	701	78
Flint, of New York,	670	75
Loomis, ¹ of New York,	763	71
Letulle, of Paris,	189	92
F. P. Weber, of London,		29
Ormeroth, of London,		50
Vilbert, of Paris,	131	17
Fowler, of London,	1,943	177
Martin, of London,	445	42
Jos. Coats, of Glasgow,	103	25
Rogée, of Paris,		51 per cent.
Standacher,		27 " "
Thomas Harris, of London,		39 " "
Fürbringer, of Berlin,		10 " "
Renvers, of Berlin,		30 " "
Bugge, of Christiania,		27 " "
Osler, of Baltimore,		7.5 " "
Walker, of Chicago,		4 " "
H. M. Biggs, of New York,		30 " "

¹ Loomis, H. P., "A Study of the Processes which Result in the Arrest or Cure of Phthisis," "Medical Record," Jan. 9, 1892.

tomie générale," vol. IV, page 538, declares tuberculosis a decidedly curable disease, and so does Charcot,¹ in his "Traité de Médecine," by saying: "Phthisis is susceptible to be cured completely and definitely even at the period of cavities." Gran-cher, in his "Leçons cliniques sur les Maladies de l'Appareil respiratoire," 1880, page 245, says: "We affirm the curability of the tubercle; we affirm that, instead of being a miserable neoplasm incapable of organization, the tubercle tends naturally to fibrous formation." Jaccoud² even maintains that pulmonary phthisis is curable in all its stages. Hérard and Cornil³ are of the same opinion. Professor Bouchard, of Paris, concluded his lectures on phthisis in the year 1888 by the following comforting words:

¹ Charcot, "Traité de Médecine de Charcot et Bouchard"; article, Phthisie pulmonaire.

² Jaccoud, "Curabilité de la Phthisie pulmonaire," 1888.

³ Hérard, Cornil et Hanot, "La Phthisie pulmonaire," 1888.

"This disease, which has such a strong hold on humanity, is curable in the largest number of cases." Of the striking and interesting answers I received to my letters, or to personal inquiries, I desire yet to cite the following: Dr. Brouardel, Dean and Professor of Legal Medicine at the Faculty of Medicine of Paris, said to me: "There is hardly any autopsy performed at the morgue, of persons having died an unnatural death, where healed tuberculous lesions, cicatrized and calcified, are not found; especially if the individual has lived more than ten years in Paris." Professor Fritz Strassmann, of Berlin, expressed himself as follows: "I have very often found old foci of pulmonary tuberculosis, cicatrized and calcified, in individuals who had died by accident." Prof. James Goodhart, Physician of Guy's Hospital of London, wrote me: "I am able to say that there is nothing more common than to find in those dead from other causes evidences of old and healed phthisis or calcareous changes in the various glands; moreover, in most cases of tubercular disease there is similar evidence that a former disease of this kind has healed. I am, therefore, accustomed to say that there is no disease that gives stronger evidence of healing tendencies than phthisis." In connection with the preceding statement, Hermann Weber's remarkable case of a twice-healed tuberculosis may be cited.¹ This case was first diagnosed in 1867 as pulmonary tuberculosis. A hæmophthisis was the cause of the patient consulting Dr. Weber. The patient was completely cured after several months of judicious hygienic, dietetic, and climatic treatment. In 1873, after a year's residence in Paris and London, he was again seized with a hæmophthisis. While in the first attack the left side was involved and the right side was free, this time it was the right side which presented the dullness, with crepitant rhonchus down to the fourth rib, the condition in which the left side had been in 1867. The left side at the time of the second attack had remained free, showing only a slight dullness. Again outdoor life and judicious hygiene and diet cured the patient. In 1881 Dr. Weber saw him again, the patient being ill with well-developed typhoid fever of a moderate type, without any lung complication. He had almost recovered, when, at the end of the fourth week of the disease, he committed, against strict advice, the

¹ Weber, "Hygienische und klimatische Behandlung der chronischen Lungenschwindsucht."

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imprudence of eating a rather large quantity of grapes, and died of a perforation of the lower part of the ileum. At the post mortem examination there were cretaceous patches in the apices of both lungs, and also in the lower lobe of the right lung.

Dr. Whittacker, of Cincinnati, said, in answer to my inquiry: "It is a great exception to find upon the post mortem table a pair of lungs totally free from some evidence of existing or preexisting tuberculosis." Dr. Nicholas, Physician-in-Chief of the Hospital of Neuchatel, in Switzerland, very kindly responded to my letter by saying: "It has happened to me repeatedly to find at autopsies cicatricial tissue, with and without calcareous foci, in the apices of the lungs; but owing to a lack of special notes I am unable to give you the exact proportions."

While we must admit that at times these foci represent only the tuberculosis which has become latent, whenever the fibrinous or calcareous transformation of the tubercles is complete these latter are no longer virulent. Kurbow¹ was able to demonstrate by inoculation that out of one hundred cases of seemingly latent tuberculosis, in twenty-seven the tubercles had entirely lost their infectious qualities. Déjerine,² who made similar investigations, examined a very large number of such old localized calcareous foci, and in not one instance could he discover the presence of the tubercle bacillus.

Of the clinical evidences of the curability of pulmonary tuberculosis, and the results obtained in special sanatoria, I will speak in the concluding chapter.

¹ Kurbow, "Arch. für klin. Medicin," 1889, vol. XLIV, fas. 5-6.

² Déjerine, "Recherche du bacille de Koch," "Compt. rend. hebdomadaire," 1884, No. 30.

CHAPTER IV.

THE COMMUNICABILITY OF PULMONARY TUBERCULOSIS, AND THE MEANS TO COMBAT ITS PROPAGATION BY INDIVIDUAL PROPHYLAXIS.

It is now generally conceded that the cause of tuberculosis in man or beast is the bacillus tuberculosis, discovered by Robert Koch¹ in 1882. Without the presence of this germ there is no tuberculosis.

The bacillus enters the human system through either the respiratory or the digestive tract; it may, however, also enter through the cutaneous system, though much more rarely, when there is an abrasion of the skin which makes the inoculation of the germ possible.

The two most important methods whereby man contracts tuberculosis—inhalation and ingestion—seem to be equally frequent. We will first consider the inhalation process.

INFECTION BY INHALATION.

An individual suffering from pulmonary tuberculosis is estimated to expectorate as many as seven billions of bacilli in twenty-four hours. This patient may not be sick enough to be in bed; in fact, the patient in bed is perhaps less a danger to his fellow-men, for, if he is careless, he must confine his unsanitary habits to one room, while the unscrupulous or ignorant consumptive still able to be about disseminates the germs of his disease wherever he goes. As long as the expectorations remain in the liquid state there is less danger from them, but matter expectorated on the floor, in the street, or in a handkerchief usually dries very rapidly, and, becoming pulverized, finds its way into the respiratory tract of any one who chances to inhale the air in which is floating this

Dried
tuberculous
sputum a
propagator
of disease.

¹ Robert Koch, "Die Aetiologie der Tuberkulose," "Berliner klin. Wochenschrift," No. 15, 1882.

dust from expectorations, laden with many kinds of bacteria.¹ The most dangerous of them all is the tubercle bacillus, which retains its virulence in the dried state for several months.²

If an individual is perfectly well, the inhalation of the bacilli will not hurt him. In health the nasal mucous secretion possesses bactericidal qualities;³ but if any one with a weakened constitution or a particular predisposition to consumption should be exposed to the inhalation of particles of dried and pulverized tuberculous expectoration, he would certainly be in the very greatest danger of thus contracting pulmonary tuberculosis. Countless are the cases reported which prove beyond a doubt this mode of propagation of the disease. In addition, tuberculosis has been produced by this method experimentally in the lower animals. The writings and experimental work of Villemin,⁴ Weber,⁵ Koch,⁶ Tappeiner,⁷ Cornet,⁸ Krüger,⁹ Straus,¹⁰ Hance,¹¹ Murrell,¹² etc., all confirm what has just been said on the danger from the careless and promiscuous expectorating of tuberculous individuals. My own investigations in this respect show that what is proved experimentally and clini-

¹ Straus, "Sur la présence du bacille de la tuberculose dans les cavités nasales de l'homme sain," "Bulletin de l'Académie de Médecine de Paris," 1894, Séance du 3 juillet.

² Sawitzky, "Zur Frage über die Dauer der infectiösen Eigenschaften des getrockneten tuberkulösen Sputums." Dissert. inaug., St. Petersburg, 1891, and "Centralblatt für Bacteriologie," Bd. XI, 1892.

³ Wurtz et Lermoyez, "Du rôle bactéricide du mucus nasal," "Compte rendu de la Soc. de Biol.," 1893, p. 756.

⁴ Villemin, "De la Prophylaxie de la Phtisie Pulmonaire," "Union Médicale," 1868, p. 150.

⁵ Weber, "On the Communicability of Consumption from Husband to Wife," "Clinical Society's Transactions," 1874, vol. VII, p. 144.

⁶ Koch, "Die Aetiologie der Tuberkulose," "Mittheilungen a. d. k. Gesundheitsamte," Bd. II, 1884, p. 79.

⁷ Tappeiner, "Ueber eine Methode Tuberkulose zu erzeugen," "Virchow's Arch.," 1878, Bd. LXXIV, p. 393.

⁸ Cornet, "Die Verbreitung der Tuberkelbacillen ausserhalb des Körpers," "Zeitschrift f. Hyg.," 1888, Bd. V, pp. 191-332.

⁹ Krüger, "Einige Untersuchungen des Staubbiederschlags der Luft in Bezug auf Tuberkelbacillen," Dissert. inaug., Bonn, 1889.

¹⁰ Straus, "La Tuberculose et son Bacille," Paris, 1895.

¹¹ Hance, "A Study of the Infectiousness of the Dust in the Adirondack Cottage Sanitarium," "N. Y. Med. Record," Dec. 28, 1895.

¹² Murrell, "Lancet," April 10, 1897, p. 1018.

cally to be possible does occur on a large scale. In visiting many of the so-called health resorts especially frequented by pulmonary invalids, I have seen these patients, in all stages of the disease, promenading and expectorating everywhere, and I became convinced that they were thus disseminating their disease among the permanent inhabitants of that region. I addressed the proper authorities in these resorts for information, and I will reproduce here the answers of two of them. The chief health officer of Nice, Dr. Ballestre, wrote: "Il est de notoriété publique que Nice, et surtout Menton, ont vu augmenter dans une proportion énorme le nombre de leurs tuberculeux depuis que les phthisiques ont fréquenté ces stations." ("It is a well-known fact that Nice, and especially Menton, have seen the number of their consumptives increased in an enormous proportion since phthisical patients have frequented these resorts.")

The Secretary of the New Mexico Territorial Board of Health, Dr. F. H. Atkins, wrote me as follows: "Like other communities much resorted to by consumptives, we are year after year discovering cases of phthisis occurring in New Mexico among people born here, or quite recently come here and healthy, and in many of them there has been a definite exposure to the infection of the tubercle bacillus."

To stop the spread of tuberculosis by the careless or ignorant consumptive we must begin by convincing him of the wrong he is doing to himself and others by the manner in which he disposes of his infectious expectoration. The danger of his becoming continually reinfected must be particularly impressed upon him. Such a patient should be taught never to expectorate except in a proper receptacle. The habit of expectorating in a handkerchief should be considered as dangerous as expectorating on the ground, for the frequent unfolding of a handkerchief containing the dried sputum is a most common way of disseminating the bacilli, and, besides, not infrequently the patient reinfests thus his upper air-passages. The frequent coexistence of pharyngeal and laryngeal tuberculosis with relatively little advanced pulmonary lesions may well be explained by this mode of secondary infection.

In all places where there are likely to be tuberculous patients, able to be about, whether in private residences, workshops, offices, hospitals, or sanatoria, there should be the proper kind of spittoons, and a sufficient number of them, properly placed and kept. Cus-

Spread
of tubercu-
losis in
health re-
sorts.

Danger
from cus-
pidors
placed on
the ground.

pidors placed on the ground should be done away with, for while a fair number of male patients may possess a certain dexterity in disposing of their sputum, I have yet to find a woman who knows how to hit the spittoon. Where much expectoration is going on,

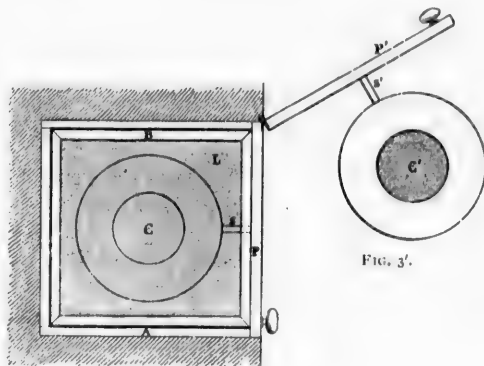


FIG. 3'.

FIG. 3.

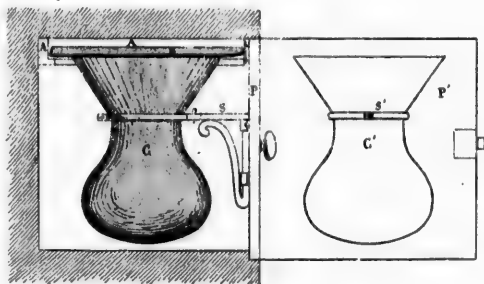


FIG. 4.

FIG. 4'.

FIGS. 3 AND 4.—SPITTOON, ELEVATED THREE FEET OR THREE FEET SIX INCHES FROM THE FLOOR, AND INCLOSED IN THE WALL.

Figs. 3 and 3', plan; 4 and 4', elevation. 3 and 4 represent the door closed; 3' and 4', the door open. A. Frame. B. Cover. C. Spittoon. P. Door. S. Hinged support. L. Linoleum cover.

one usually finds the brims of the cuspidors that are placed on the floor covered with dried sputa, and even the piece of oilcloth placed underneath as a precautionary measure often shows signs of the inexperienced spitter. To obviate these difficulties, and still

make the presence of numerous cuspidors in either private dwelling, hospital, or sanatorium as little objectionable as possible, I have devised an arrangement of elevated spittoons, visible only when in use. In the walls of parlors, halls, galleries, etc., at appropriate distances, are constructed small niches or cupboards 3 or 3½ feet from the floor. They are large enough to hold a spittoon eight inches high and about the same diameter. Not to expose the persons intrusted with cleaning these vessels to the possible danger of inoculation by breakage of porcelain, I prefer metal spittoons. Blue enameled iron seems to be the most practical of all. The dark-blue color makes the contents less visible. The cuspidor is supported by a metal ring attached to the door of the cupboard. The patient desiring to expectorate opens the little door, thus bringing the spittoon within his reach, and closes it again when he gets through. An automatically closing extra cover makes it impossible for flies or other insects to sojourn in the interior.

The drawing will more fully explain the construction and the working of this arrangement. In the grounds surrounding the hospital or sanatorium the niches may be replaced by boxes mounted on stands (see Fig. 5) or attached to the trunks of trees. The cuspidor of metal, elevated and covered, has additional advantages over the usual uncovered vessel of porcelain or earthenware. Animals, such as cats, dogs, etc., will not be able to reach the contents of the cuspidor; and there is less danger of its bursting when placed outdoors at freezing temperature if covered and inclosed in a box. In the grounds of institutions where porcelain vessels have been placed it has happened that the frost cracked the spittoons and caused their contents to be spread over the ground. Now, it is well

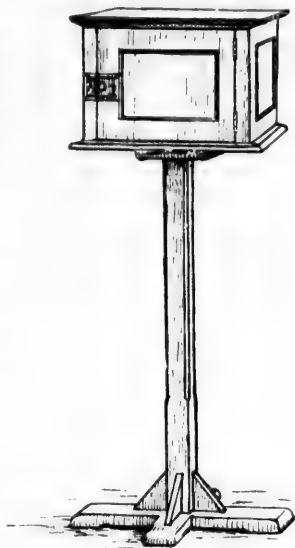


FIG. 5.—ELEVATED STAND FOR SPITTOON.

known that the tubercle bacillus does not die at the freezing temperature, and hence there is danger in the use of porcelain vessels.

Galtier,¹ and later Cautéac and Malet,² have exposed the tuberculous expectoration to repeated freezing and thawing, and a temperature of -8° C. did not destroy the virulence of these tuberculous products.

Flies may
transmit
bacilli.

For factory and workshop use, Predoehl's³ enameled iron spittoon, of which I also give a drawing (Fig. 6), seems to answer all practical purposes, especially if its cover can be made to close more tightly, so that flies cannot enter. This is a rather important item in the prophylaxis of tuberculosis. Spillmann and Haushalter,⁴ of Nancy, have demonstrated by extensive experiments that the fly may become the propagator of tuberculosis. The abdominal cavities of flies caught in the rooms of consumptives were found to contain the living bacilli, so also did the fly-specks scraped from the walls and windows of hospital wards and rooms where consumptives habitually sojourned. The same experiments were repeated and verified by Hoffmann.⁵ Now, the danger from these infected insects is twofold. They die and crumble to dust which contains the bacilli, and the micro-organisms may thus enter the system through the respiratory tract. Or the fly which may have partaken of the tuberculous expectoration deposits its excrements at the next opportunity upon some article of food, whence the bacilli contained in the deposit find their way into the alimentary tract of man or beast.

Predoehl's cuspidor—which is about nine inches high, eight inches at its largest, and three inches at its smallest diameter—can be suspended at any height, and can be very easily cleaned and disinfected.

A third kind of spittoon is the small mug, which should also be of some unbreakable material,—enameled iron, tin, or aluminum,—and, of course, with a tightly closing cover. On account of its

¹ Galtier, Congrès pour la tuberculose à Paris, 1888.

² Straus, "La Tuberculose et son Bacille," Paris, 1895.

³ Predoehl, "Der Spucknapf," "Münchener med. Wochenschr.," Oct. 22, 1895.

⁴ Spillmann et Haushalter, "Dissémination du bacille de la tuberculose par les mouches," "C. R. de l'Académie des Sciences," 1886, vol. cv, p. 352.

⁵ E. Hoffmann, "Ueber die Verbreitung der Tuberkulose durch unsere Stubenfliegen," 1888.

lightness, I prefer the last-mentioned metal. I give here a design of the form which seems to me most convenient (Fig. 7). Another kind of spittoon of practical use, at home or in institutions, is the Seabury and Johnson spitting-cup, made of impermeable pasteboard, to fit in a metallic frame with handle and cover.



FIG. 6.—DR. PREDOEHL'S SPITTOON FOR FACTORIES AND WORKSHOPS.



FIG. 7.—SPIT-CUP FOR USE ON THE VERANDA AND AT THE BEDSIDE.

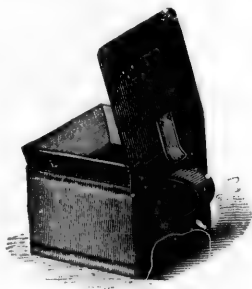


FIG. 8.

SEABURY AND JOHNSON'S SPITTING-CUP.
a. Frame. b. Folded cardboard.



FIG. 9.

When the cup is filled, the pasteboard is taken out and burned, with its contents. These are the cuspidors for patients in bed or for such who are taking the rest cure on the veranda. Patients who are too weak to make use of this cup should have at their bedside a number of moist rags, which should be burned immediately after use or, at least, before they have had time to dry.

We now come to the fourth kind of spittoons—the pocket flask, which, to my mind, when properly and faithfully used by the pulmonary invalid, will prove one of the most important factors in the prevention of tuberculosis. It should be carried by the tuberculous individual all the time, and used whenever he can not conveniently get at the stationary cuspidors. One of the most ingenious pocket spittoons invented is Dr. Dettweiler's "Husten-fläschchen," of which I will also give an illustration (Fig. 10). It is a flask of blue glass, about four inches long and six inches



FIG. 10.—DR. DETTWEILER'S
"HUSTENFLÄSCHCHEN."

in its largest circumference, provided with a hermetically closing top and bottom, and so constructed that it can easily be cleaned. The lid flies open at a slight pressure on the spring, and after use is closed by pushing the top down again. This otherwise excellent flask has a few disadvantages, which I have sought to overcome by the construction of an aluminum pocket flask. This is, of course, unbreakable, which can not be said of a glass flask, where the danger of inoculation in case it should break in the pocket must not be forgotten. As can be seen from the drawing (Fig. 11), it is, like Dettweiler's, constructed so that its contents cannot be spilled by tipping over; but instead of being of three pieces it is of but two, can easily be cleaned, and boiling will not injure it. Instead of six ounces (which is the weight of the glass flask) it weighs but two ounces. Its length is four inches and its nearly uniform diameter is but $1\frac{3}{4}$ inches. Thus the aluminum flask is less bulky, can be manipulated with more ease, and will attract less attention. It can be easily hidden in the folds of a handkerchief when used. This is an important point, for consumptives are naturally sensitive, and are ever anxious not to attract attention to their infirmity.

Precaution
against
reinfection
and the
expulsion
of particles
of sputum.

There is one precaution to be observed in connection with the use of the pocket flask and the cuspidor in general. I always tell my tuberculous patients never to use the same handkerchief for wiping the nose that they use to wipe their mouths after having expectorated. They should have two handkerchiefs with them,

and always hold one before their mouth during an attack of coughing or sneezing, to guard against the expulsion of small particles of sputum. Flügge and Latschenko¹ have demonstrated the need of such precaution through careful and extensive experiments. They requested some consumptives to cough (but not to expectorate) in a large glass box. The patients had to put on new coats and rubber shoes, to make the detaching of particles of dried sputum, which might have been on their clothes, impossible. Sterilized glass plates, somewhat moistened, had been previously placed in the upper portion of the big box. Animals inoculated with the substance scraped off these plates were rendered tuberculous.



FIG. 11.—DR. KNOFF'S POCKET SPUTUM FLASK.

In special institutions—sanatoria and hospitals—one can, of course, carry out prophylactic measures to guard against the expulsion of particles of sputum which would be much less practicable for patients outside of such establishments. Professor B. Fraenkel, for example, has inaugurated, at the Berlin "Charité," this innovation: All the tuberculous inmates must wear masks (Fig. 12) to catch the germs they expel in speaking and coughing when they are in the common room, and only remove them while eating or expectorating.² The patients soon become accustomed to the

¹ Flügge, "Deutsche med. Wochenschrift," 1897, No. 42.

² B. Fraenkel, "Zur Prophylaxie der Tuberkulose," "Berl. klin. Wochenschrift," 1899, No. 2.

mask, as by impregnating the gauze, which is held in place by the metallic frame, with some medicinal substance they suppose it is to be worn for their own personal benefit, instead of for the protection of others. Bacilli are frequently found on the gauze. It is, of course, self-understood that the gauze, lint, or cotton removed from these respiratory masks should be burned immediately, and the masks disinfected at regular intervals.

A patient should, if possible, have two pocket flasks, so as never to be without while one is being cleaned. In hospitals and sanatoria the same rule should hold good for the fixed cuspidors. In such institutions the person who attends to the cleaning of these vessels should, during his work, be provided with rubber gloves, so as to remove all possible danger of inoculation through an abrasion of which he might not be aware.

Cleaning
and disin-
fecting
cuspidors.

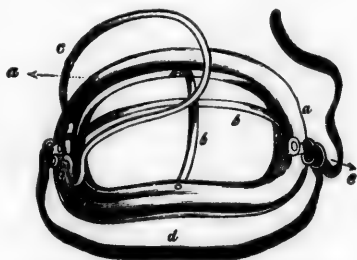


FIG. 12.—PROF. FRAENKEL'S MOUTH MASK.
($\frac{1}{2}$ natural size.)

a. Metal ring. b. Supporter. c. Saddle. d. Elastic band. e. Rings for fastening.

The most thorough method of cleaning any cuspidor filled with tuberculous sputum is certainly the one recommended by Professor Grancher, of Paris,¹ consisting in placing the spittoons—contents and all—in boiling water, where they are left for five or ten minutes; by the

addition of some bicarbonate of soda the boiling-point will be raised to 102° or 103° C., which will destroy the tubercle bacilli most certainly. The next best, and perhaps the most convenient method, is to mix the tuberculous expectoration freely with a five per cent. solution of carbolic acid. After this in order of efficacy comes the bichloride solution of 1 to 1000. This should always be used in combination with tartaric acid, citric acid, or some other preparation that will prevent the coagulation of albumen. The strength of the solution of corrosive sublimate should be 1 to 500. According to the experiments of Yersin,² it took thirty seconds to

¹ Grancher, "Maladies de l'appareil respiratoire," Paris, 1890.

² Yersin, "De l'action de quelques antiseptiques et de la chaleur sur le bacille de la tuberculose," "Annales de l'Institut Pasteur," 1888, p. 60.

kill the tuberculous germs immersed in a five per cent. solution of carbolic acid, while it took ten minutes before all the germs were killed when immersed in a bichloride solution of 1 to 1000. Every stationary cuspidor, and also the hand-cup in the sick-room or on the little table next to the steamer-chair where the patient takes his rest cure, should be filled every morning to about one-fifth with a five per cent. carbolic acid solution. Of late, wood vinegar (*acidum pyrolignosum*) has proved to be an excellent disinfectant for tuberculous secretions. It kills the bacilli after six hours, and takes also from the expectorated matter its unpleasant aspect.¹

To encourage the use of the pocket flask, one must make its manipulation, and especially the process of cleaning, as simple as possible. Thus the directions which accompany the aluminum pocket flask above referred to are as follows: To empty the flask, unscrew the top and pour the contents into the water-closet; or fold a newspaper into several layers, pour the contents on to this, and throw the whole at once into the fire, being careful not to spill any.² Rinse the flask in hot water and wash the hands immediately afterward.

Some consumptive individuals will not use the pocket flask, in spite of all persuasion, for the simple reason that they do not wish to attract attention to their malady. For these there is but one thing to do—to tell them to use squares of cheap linen handkerchiefs, or Japanese paper handkerchiefs specially manufactured for that purpose,³ which can be burned after use. But I should insist that they place in their pockets a removable lining of rubber or other impermeable substance which can be thoroughly cleaned. This additional pocket could be fastened to the inside of the ordinary pocket by clamps, and thus be of no inconvenience to the patient. Of course, all invalids using handkerchiefs as receptacles for expectorations take their chances of infecting their hands, and should be enjoined never to touch any food without having thoroughly washed them.

¹ "Zeitschrift für Krankenpflege," xx, No. 9.

² For the practical suggestion of using newspaper for this purpose I am indebted to Prof. Prudden, of Columbia University.

³ Weise, "Handkerchiefs for Consumptives," "Lancet," Nov. 14, 1891.

INFECTION BY INGESTION.

Bacilli in
the saliva.

The saliva of consumptives frequently contains the tubercle bacilli. Petit,¹ Freudenthal,² and many others have reported their clinical experience in this respect, which shows that there is real danger in kissing tuberculous patients on the mouth. The napkins used by consumptives should be boiled after each meal. If, for economic reasons, a freshly washed napkin can not always be had, Japanese paper napkins, which are burned after use, may be substituted. Knives, forks, spoons, glasses, etc., should be thoroughly boiled or sterilized after each use. How important it is to tell the patient about all these things, and explain to him the reasons, may best be illustrated by the following anecdote: I was called in consultation to see a phthisical lady, and on the way there the family physician told me how particular he had been to warn his patient of the contagious nature of her disease. On our arrival we found the young mother with a baby a few months old in her arms. She was preparing the food for her infant, which sacred duty she would intrust to no one else. She had one spoon for herself and baby, with which she tasted the food to judge of its palatability and temperature. She then told me that since the good doctor had told her that her disease was contagious she had never once kissed her darling child. To the mind of this unfortunate mother it was the kiss alone, the direct contact, that was capable of transmitting the disease, and she restrained herself from caressing her child. But, unconsciously, she was conveying the bacillus into the very food of her infant.

Consumptive men should either wear no beard at all or keep their mustaches and beards closely cut, so that they may be easily kept clean and not become the cause of infection or reinfection.

It is of great importance to tell the patients never, out of false modesty or for any other reason, to swallow their expectoration. There is always danger of an intestinal infection. Among the insane tuberculous patients, secondary intestinal tuberculosis is of most frequent occurrence.³ There seems to reside a certain danger

¹ L. H. Petit, "Sur quelques modes peu connus de contagion de la tuberculose par la voie buccale," "Revue de la Tuberc.," 1, 11, 1894.

² Freudenthal, "Kleinere Beiträge zur Aetiologie der Lungentuberkulose," "Archiv für Laryngologie," Bd. v.

³ Mosler, "Ueber die Infection der Darmschleimhaut beim Verschlucken tuberkulöser Sputa," "Deutsche med. Wochenschrift," 1883, No. 19.

in the cigars and cigarettes that are made by hand. The saliva ^{Bacilli in cigars.} which the tuberculous laborer uses to fasten the cover of the cigar or cigarette may convey the tubercle bacillus to the smoker. Dr. J. C. Spencer, of the San Francisco Board of Health, has actually demonstrated the presence of these bacilli in various specimens of cigars submitted to him for examination. Now, although the nicotine may kill the bacillus, it does not render it thereby inoffensive. Prudden and Hodenpyl¹ showed by their very interesting experiments that the dead tubercle bacilli still contain a specific protein capable of doing harm in the living tissue. Grancher and Ledoux-Lebard,² who carried on similar experiments, called the cellular reaction produced by the dead bacillus "necro-tuberculosis." ^{Necro-tuberculosis.} In view of the possible danger of this mode of infection, it would, of course, be well to advise all persons predisposed to consumption not to smoke at all, and the same rule may hold good for all individuals whose constitution is weakened from some cause or other.

Infection from the ingestion of tubercle bacilli is also made possible by the patient soiling his hands with the expectoration directly or, as has been stated above, through the medium of a soiled handkerchief, and then touching his food, thus conveying the bacilli to the digestive tract. That such infection from the hands in pulmonary phthisis is possible has been very ably demonstrated by Dr. E. R. Baldwin, of Saranac Lake, in an article which appeared in the "Philadelphia Medical Journal" of December 3, 1898.

A tuberculous patient should always sleep alone, and in a bed which should be freely aired during the day-time. Very weak patients who do not leave the bed should, whenever it is possible, have a second bed placed in their room, so as to be able to change. It is, of course, always desirable that a consumptive should not share his room with any one else. The attendant or nurse should sleep in an adjoining room. The soiled linen of consumptive patients should be placed in water immediately after the removal from bed or body, and be washed separately, or at least boiled before it is given to the general laundry. ^{Care of room, bed-linen, etc.}

¹ Prudden and Hodenpyl, "Studies on the Action of Dead Bacteria in the Living Body," "N. Y. Med. Journal," June 6, 20, 1893.

² Grancher et Ledoux-Lebard, "Tuberculose aviaire et humaine," "Arch. de méd. expérim. et d'anatom. pathol.," 1892, p. 25.

The room of a tuberculous patient should be sunny, cheerful, and well ventilated. The floor should be covered by small rugs only. Velvet or plush-covered furniture should be replaced by such as will not accumulate dust. Raising dust by sweeping with a broom should never be allowed in any sick-room, but particularly not in one occupied by a pulmonary invalid. A moist mop should be used to remove the dust from the floor, and the furniture should be wiped carefully. In case of death or removal, the room that has been occupied by a consumptive should be thoroughly disinfected by placing therein a good formaldehyde generator for twenty-four to thirty-six hours; then carefully cleaned, scrubbed, whitewashed, papered, or painted before being occupied again. The carpet, rugs, bedding, etc., should, of course, be disinfected with the room.

Holy water
and com-
munion-
cups.

Just as it must be considered unhygienic and a probable cause of the propagation of diseases, such as diphtheria, influenza, tuberculosis, etc., to besprinkle one's self with holy water which has been standing for days in churches, and in which the multitudes have dipped their fingers, so does it seem unwise to use a common communion-cup in the Protestant churches. The individual communion-cup is certainly to be preferred. The Indiana State Board of Health has taken up this matter recently, and recommended the use of individual cups.

Bible-
kissing.

On the same principle we should also condemn the custom still frequent in this country of kissing the Bible when being sworn before court. It is gratifying to note here that Governor Roosevelt, of the State of New York, has signed a bill to permit witnesses to dispense with kissing the Bible in the administration of oaths. Magistrate Kudlich, of the Harlem Court, in commenting upon this health-measure, said that at one time he had noticed a witness, whose lips were a mass of ulcerated patches, kiss the Bible when being sworn. The Magistrate had at once ordered the book to be destroyed, and had given notice that thereafter no witnesses should be asked to kiss the book.

Ingestion
of tubercu-
lous food.

The most frequent cause of infection by ingestion is due to the use of tuberculous milk or meat as nutriment. In our chapter on bovine tuberculosis I will endeavor to explain at length why the contraction of tuberculosis by ingestion is still so very frequent, and more frequent than physicians and sanitarians are usually willing to admit. Here I will only say that in children

it is the delicate intestinal epithelium which offers to the bacilli contained in tuberculous milk the most favorable abiding-place. And the reason we so rarely find primary tuberculosis in adults, in spite of the frequent ingestion of tuberculous substances, is to be explained by the fact that with them the epithelial lining of the intestines is stronger and resists the colonization of cultures. If the individual is in poor health, and the phagocytic power of the blood enfeebled, the bacilli ingested by a grown person usually find the apices of the lungs to be the *locus minoris resistentiæ*, which they reach through the medium of the circulation of the blood.

The individual can only protect himself against the ingestion of tuberculous substances by boiling or sterilizing all milk and thoroughly cooking all meat of doubtful origin.

Midwives and also physicians will often, in the presence of an asphyxiated newborn child, apply their mouth to that of the infant and inflate the child's chest in order to bring its respiratory organs into play. If the operator is consumptive, the danger of imparting his or her disease to the infant is evident. To avoid such possibility the mouth-to-mouth respiration should be replaced by the safer method of using the catheter, as recommended by Tarnier and Lusk. Laborde's method of rhythmical traction of the tongue will also often suffice to cause the child to breathe. The habit some midwives have, of sucking the mucus from the child's throat by direct application of the mouth, is equally to be condemned. Reich reported, in the "Berliner med. Wochenschrift," No. 37, 1878, ten cases of tuberculous infection through this method. A midwife in the village of Neuenberg became consumptive in 1874, and died of this disease in July, 1876. Ten children, without hereditary predisposition, attended by this midwife between April, 1875, and May, 1876, died before reaching the age of seventeen months. This consumptive midwife was in the habit of sucking the mucus from the mouths of newborn children, and blowing air into their mouths when there was the slightest sign of asphyxia.

Danger of mouth-to-mouth respiration in asphyxiated infants.

The physician who is attending a consumptive engaged in such occupation as that of a dairyman,¹ a milk-dealer, baker, confectioner, cook, or butcher, should be particularly careful in instructing his patient concerning the danger to himself and others of his being careless with his expectoration or other secretions. If the patient

Trades requiring special supervision.

¹ See also chapter on bovine tuberculosis, page 66.

is refractory, the physician's duty would be to report him to the authorities as a menace to public health.

Precaution
to be taken
in bakeries.

A very recommendable precaution was recently instituted in some of the large bakeries of Germany, in connection with the handling and transporting of bread. The moment the bread comes out of the oven, while it is still too hot to be handled, it is placed, by the aid of a shovel, upon a piece of wrapping-paper large enough to envelop the whole loaf. By twisting the two ends of the wrapper the bread is completely inclosed. This is certainly a more hygienic way than the one now in vogue in nearly all countries. A loaf of bread coming from one of the public bakeries, and especially in the districts of the poor, usually passes through any number of hands. Sometimes it may be handled by those afflicted with disease, and it often passes through hands of doubtful cleanliness before it reaches the consumer's mouth. No one would think of washing the crust of bread which has been exposed to all sorts of contaminating influences in the bakeshop, bakery-wagon, grocery-store, etc.; but we would not think of eating any other article of food treated in the same way without submitting it to a thorough cleansing. I believe it would be a veritable protection to the people if the sanitary authorities would compel all public bakers and bread-dealers to institute some such sanitary method of handling the bread as I have described.

Danger
from caressing
domestic
pets.

In speaking, on page 46, of the danger from the sputum and saliva of tuberculous patients, we have already referred to the unsanitary habit of kissing. Many a time consumption has been transmitted in this way from one member of a family to another, but I desire yet to call attention to the equally dangerous habit of kissing domestic pet animals. The parrot and the canary-bird are, perhaps, the animals which, when domesticated, take tuberculosis most easily, and then constitute a real danger in the household.¹ Dogs and cats come next in order of frequency of tuberculous infection. Kissing and caressing all such domestic pets, especially by children, should be strictly forbidden. The authorities should have a right to destroy small domestic animals if they are afflicted with tuberculosis.

In case of intestinal tuberculosis it is, of course, essential to dis-

¹ Straus, I., "Sur la tuberculose du perroquet." "Arch. de méd. expér.," January, 1896. Weise, T., "Consumption and Canaries" (The Hospital). "Journal of the American Med. Assoc.," vol. XXXII.

infect the stools by either a five-per-cent. carbolic-acid solution or a corrosive-sublimate solution of 1 to 1000, or by reducing them to ashes in an oven constructed for the purpose. The burying of either the expectorated or fecal matter from the tuberculous patient without its being previously treated by one of the above methods is not safe. Lortet and Despeignes reported to the Paris Academy of Science, on January 25 and July 4, 1892, their experiments with the earth-worm, which show that this lumbricus may be instrumental in bringing to the surface again the bacilli from buried tuberculous substances. Animals which might chance to pasture in the vicinity of spots where such substances have been buried are certainly in great danger of ingesting the tubercle bacilli. All persons handling vessels containing tuberculous substances should be very careful, for, while not having the disease themselves, they may unconsciously transmit it to others.

Possible transmission of tuberculosis by earth-worms.

INFECTION BY INOCULATION.

Consumptives who attend to the cleaning of their spittoons themselves must be especially prudent. If they have anywhere a cutaneous abrasion, they must be careful not to soil it with saliva or expectoration. The habit of putting an injured finger in the mouth has not infrequently caused local tuberculosis in consumptives, the result of an auto-inoculation.¹ Surgeons and nurses should be particularly careful when attending surgical cases of tuberculosis. I have had occasion to observe such an inoculation in the service of a colleague of mine. The unfortunate nurse came well-nigh losing his whole hand from dressing a tuberculous wound. The seat of entrance of the tuberculous infection was only a slight abrasion of the skin which had passed unobserved.

Pathologists handling fresh tuberculous specimens, physicians performing autopsies, and students dissecting tuberculous subjects, are also greatly exposed to the danger of becoming inoculated with tuberculosis. The "piqueure anatomique" has, alas! too often developed into a serious tuberculous infection. To incise freely with an aseptic instrument at the seat of inoculation and apply a careful dressing of bichloride of 1 to 3000 seems the best immediate step to take in case such accidents happen.

¹ K. Ullmann, "Cutaneous Tuberculosis by Auto-infection," "New York Lancet," April, 1898.

Infection
from wet-
nurse to
child, and
vice versa.

Infection from wet-nurse to child, and vice versa, is possible. Happily the cases where a tuberculous mother nurses a child are now exceedingly rare; thus one sees this mode of inoculation seldom, but against the other we should always be on guard.

I would have no hesitation to give the child of a consumptive mother to a healthy wet-nurse, provided a most thorough examination of the infant revealed no sign or symptom of tuberculous infection; but, if there is the slightest doubt, a wet-nurse should not be exposed to the probability of becoming infected by the child. Weber's case, cited in his Croonian lectures of 1885, gives a very striking example of the possibility of a tuberculous child communicating the disease to a healthy wet-nurse who had no hereditary predisposition.

Vaccina-
tion.

The possibility of transmitting the tuberculous disease to a child through vaccination can not be denied,¹ especially when one considers that the vaccine is now almost exclusively obtained from young bovine animals. Although Villain's statistics show a comparative rarity of tuberculosis in calves between the ages of four to six months, it seems to me good practice to follow Brouardel's suggestion² that, in order to obtain absolute security, the best thing would be to slaughter the animals immediately after they have served as vaccinifers, to keep the vaccine obtained and not to use it until the examination of the slaughtered animals had shown that there was no trace of tuberculosis in their organs.

Infection
through
sexual rela-
tions.

That a tuberculous infection can take place through sexual relations has been again and again demonstrated. All phthisio-therapeutists have occasionally met with such cases. I only need to refer to the works of Reclus,³ Schuchardt,⁴ Carrera,⁵ and Petit.⁶ Education in private by the family physicians, and in some cases,

¹ Surmont, H., Article "Vaccine," "Traité de Médecine et de Thérap." Brouardel, Gilbert, et Gironde, vol. 1, 1895, p. 207.

² Brouardel, Article "Vaccina," "Twentieth Century Practice."

³ Reclus, P., "Clin. chir. de l'Hôtel Dieu," Paris, 1888 (514-527).

⁴ Schuchardt, K., "Die Uebertragung der Tuberkulose auf dem Wege des geschlechtlichen Verkehrs." "Arch. für klin. Medicin," Berlin, 1892, XLIV.

⁵ Carrera y Miro, "Contagio tuberculoso por la via genital." ("Gac. med. catal.," Barcelona, 1888 XI, p. 385).

⁶ Petit, L. H., "Tuberculose et rapports *ad ore*." "Revue de la Tuberculose," vol. II, p. 234.

perhaps, the sanitary police intervention, can only do the necessary prophylactic work.

Of less frequent causes of propagating tuberculosis, but which, in the light of modern sanitary science, can and should be prevented, I will cite first the ritual act of circumcision, practised according to Jewish rites. This operation has, in numerous instances, been the cause of transmitting to an innocent, healthy child the disease in question. The tuberculous inoculation manifests itself first as a local disease of the genital organs, from whence, in a great number of cases, it becomes generalized. Of the earlier cases reported, I will mention the one of Lindemann¹; "Two children who were circumcized by a man who was in the last stage of consumption, and who, after the circumcision, sucked the prepuce, according to the Jewish rites, both became infected with ulcers on the prepuce and swelling of the genital glands. One recovered; the other's infection continued, the child developing Pott's disease and dying finally, after a few years' suffering, from pulmonary phthisis."

Danger of tuberculosis in ritual circumcision.

Since then the surgical literature of all countries, where Israelites practise this rite, occasionally contains notes of cases of tuberculous infection through this *modus operandi*. Professor A. Jacobi, of New York, had the courtesy to tell me that he remembers having seen as many as twelve cases of tuberculosis following ritual circumcision. Drs. Ware and Moschkowitz, of the same city, have also very kindly reported to me several recent cases of the same kind. Dr. Willi Meyer, in a very able paper, read before the Scientific Union of German Physicians of New York, on March 25, 1887,² reporting one of his own observations of such tuberculous infection, calls attention to the manifold dangers to which a child is exposed through the performance of this rite, and comes, with Professor Maas,³ to the conclusion that it should be the duty of every physician to protest against ritual circumcision. It is well known that syphilis and diphtheria have also been transmitted through this suction process, and, again, that through lack of skill

¹ Lindemann, "Deutsche med. Wochenschrift," No. 30, 1883.

² Meyer, "Ein Fall von Impf-Tuberkulose in Folge ritueller Circumcision." "N. Y. Med. Presse," Juni, 1887.

³ Maas, König's "Lehrbuch der spec. Chirurgie," 4. Aufl., II, p. 588.

in after-treatment secondary hemorrhage, erysipelas, and gangrene¹ have ensued. Too many a young life has thus been needlessly sacrificed. The operation of circumcision, when skilfully and rapidly performed, is in itself trifling, but the sucking of the prepuce afterward makes it dangerous. Since it will be difficult to stop this practice by a simple protest on the part of physicians, and as the law cannot interfere with the free exercise of a religious rite, I should suggest as a remedy that only such persons should be allowed to perform circumcision as have shown the necessary skill before a medical board of examiners, and that every time they are called upon to perform the rite they should submit themselves to a medical examination. Only when bearing a certificate from a regular physician, stating the absolute freedom from specific diseases, should they be allowed to perform ritual circumcision.

How this
rite may be
performed
with com-
parative
safety.

As another reliable prophylactic measure against the possibility of inoculating the child, when the parents insist upon the orthodox method of circumcision, is the suction by the aid of a glass tube, as practised in France and Germany.

Tattooing.

I will also mention the possibility of inoculating tuberculosis by the process known as tattooing. Messrs. Collins and Murray reported no less than three cases in the "British Medical Journal" of June 1, 1895. They were three boys of the age of ten, thirteen, and fifteen, respectively, all inoculated by the same person, and all three died from general tuberculosis. Not to allow such useless and dangerous practice would seem the only prophylactic remedy.

Before closing with the subject of the communicability of pulmonary tuberculosis, I desire to return to the recent experiments of Flügge and his pupils.² While by no means disproving the conclusions of Cornet and his followers, in regard to the danger of dried tuberculous sputum as a means of propagating the disease, these experiments have nevertheless added a good deal to our knowledge of the methods of tuberculous infection. We have already referred to Flügge's work in speaking of the danger which

¹ Brothers, A., "Gangrene of the Penis After Ritual Circumcision," "Medical Record," Jan. 30, 1897.

² "Zeitschrift für Hyg. und Infektionskrankh.," 1899, vol. xxx, No. 1.

may result from the expulsion of particles of sputum containing bacilli during the act of coughing or sneezing, and have recommended holding a handkerchief before the mouth and nose at such moments, and, in addition, where it is practical, the use of Fraenkel's mouth-mask.

That an expulsion of particles of infectious sputum is possible, even during the act of speaking, must also be admitted. The very interesting experiments of Latschenko and Heymann in the laboratory of Professor Flügge have, however, demonstrated that for the infection to take place through the expulsion of particles of sputum a close proximity to the invalid is essential. At a distance of over four feet from the patient this mode of infection is no longer possible. Again, this danger is still more reduced by the fact that not all individuals afflicted with pulmonary tuberculosis have bacilli in their saliva; also the time the physician, nurse, or friend need to be in close proximity to the patient is rarely longer than a few moments.

Bearing all these points in mind, we may, after all, say that with a clean, conscientious consumptive, with a faithful nurse, and intelligent friends and relatives about him, the danger of his communicating his disease to others is very small indeed.

CHAPTER V.

PUBLIC PROPHYLAXIS IN REGARD TO TUBERCULOSIS IN MAN.

We will now consider the duties of the sanitary authorities and the general government in regard to prophylaxis.

We have, I believe, pointed out all that can reasonably be expected from the tuberculous patient and those who surround him, in being instrumental to stop the spread of this disease. What remains must be done by the sanitary authorities, aided by the good-will of the physician, especially the general practitioner. It is he, under whose observation come the greatest number of cases of pulmonary tuberculosis, who is most likely to discover them in the incipient state.

Compul-
sory regis-
tration of
tuberculous
patients.

Experience has demonstrated that compulsory registration or reporting tuberculous cases finds little favor with the general profession. The controversy which went on between the Board of Health of the City of New York and the medical profession at large of that city is, perhaps, the best proof that the time for such radical measures has not come yet. If we succeed, if not in stamping out, at least in reducing in a marked degree, the mortality from phthisis pulmonalis without resorting to any measures unwelcome to the medical profession and the laity alike, so much the better. But to attain this end a co-operation of the sanitary authorities—government, States, county, or city boards of health and all medical practitioners—is indispensable. It should be made possible for the general practitioner to send any suspected sputum to his respective health board for bacteriological verification. He should be provided with circulars issued by the board to give instructions to the patient, his family, and friends. These circulars will be placed by the medical attendant in the hands of such person among the friends of his patients as he can trust to carry out his instructions.

If the physician thinks it best, he will give the instructions to the patient directly. If this latter be refractory, insane, or too ignorant,

and his family or friends, from some reason or other, are unable to prevent him from disseminating his disease by promiscuous expectorating, it should become the duty of the physician to report the case to the respective sanitary authorities, who should effect proper restriction, or, if necessary, isolation.

The strictest supervision on the part of the board of health in regard to tuberculosis should be exercised over insane asylums, prisons, cloisters, large boarding-schools, and all places where many people are constantly confined to a relatively small space. The statistics from all over the world show that the mortality from pulmonary tuberculosis in these places has been higher than anywhere else.¹ My personal visits to some otherwise well-regulated prisons and similar institutions have convinced me of the need of more serious attention to this matter. A most recommendable innovation in this respect is the projected convict camp of tuberculous prisoners of the State of Alabama.

Supervision
of institu-
tions and
destruction
of centres
of infection.

In many cities tuberculosis seems to cling to certain localities and houses owing to the nature of their construction. The disease appears in a veritable endemic form, either from the fact that careless tuberculous patients have lived for years in these houses or from the equally important fact that the soil on which these houses have been built, or the manner in which they have been constructed, is of a nature to retain the tuberculous infection indefinitely. That this is so has been shown by the report of Professor Biggs,² of the Health Board of New York, and the interesting works on this subject by Dr. Flick,³ of Philadelphia.

When a thorough sanitary overhauling does not suffice to stamp out these centres of infection, the destruction of such dwellings seems the only remedy.

The circulars issued by the board of health in regard to any disease, but especially in regard to consumption, should be framed in clear, precise, untechnical, and comprehensible language. They should call attention to the danger from an unclean, unscrupulous consumptive, and explain wherein this danger lies and how to avoid it. But the circular should explain also that, if proper pre-

Circulars of
instruction
and free
disinfection.

¹ Cornet, "Zeitschrift für Hygiene," vol. VI, part 1, 1889.

² Biggs, "The Action of the Health Department in Relation to Pulmonary Tuberculosis." A report, 1897.

³ Flick, "The Contagiousness of Phthisis," 1888.

cautions are taken there is no danger in associating with such a patient. Not to frighten very impressionable natures, the circular should state that pulmonary tuberculosis is one of the most curable and frequently cured diseases, for this has been amply proved; and the earlier the patient puts himself under the doctor's care the more chance has he for an early and complete recovery. Such circulars should be freely distributed, and especially in the densely crowded districts of large cities.

To the poor a free disinfection by the health authorities should be held out as an inducement to avail themselves of such an opportunity.

The disinfection of the rooms occupied by a consumptive should not only take place after his demise, but should also be made obligatory at stated intervals during his life-time. The method indicated by Novy and Waite in the "Medical News" of May 21, 1898, seems to me most practical and recommendable: (1) All cracks or openings in the plaster or in the floor, or about the door and windows, should be caulked tight with cotton or with strips of cloth. (2) The linen, quilts, blankets, carpets, etc., should be stretched out on a line in order to expose as much surface to the disinfectant as possible. They should not be thrown into a heap. Books should be suspended by their covers, so that the pages will fall open and be freely exposed. (3) The walls and the floor of the room, and the articles contained in it, should be thoroughly sprayed with water. If masses of matter or sputum are dried down on the floor, they should be soaked with water and loosened. No vessel of water should, however, be allowed to remain in the room. (4) One hundred and fifty centimetres (five ounces) of the commercial forty-per-cent. solution of formalin for each one thousand cubic feet of space should be placed in the distilling apparatus and be distilled as rapidly as possible. The keyhole and spaces about the door should then be packed with cotton or cloth. (5) The room thus treated should remain closed at least ten hours. If there is much leakage of gas into the surrounding rooms, a second or third injection of formaldehyde at intervals of two or three hours should be made.

Dispensaries should distribute suitable pocket-spittoons gratuitously to their very poor tuberculous patients. Those able to pay for them should be treated only under the condition that they provide themselves with such pocket-flasks.

Each community should have health ordinances to suit its own conditions. A place which is a favorite resort for pulmonary invalids will require much more stringent rules in regard to boarding-houses and hotels than the average place. To put in public conveyances, halls, theatres, churches, etc., placards making spitting on the floor a punishable offense will prove a good thing everywhere. If it does not deter all the spitters from expectorating wherever they please, it will deter some.

In Denver the City Improvement Society has sent out the following note to all physicians residing in the city: "Realizing that physicians can do more than any one power to prevent the spread of consumption, and to insure sanitary reform in the matter of non-expectoration on the sidewalks, to the physicians of the city we therefore appeal for co-operation, that by instructing their patients not to spit on the sidewalks we may have a cleaner and more healthful city."

The city attorney has also prepared a bill, as follows: "Section 1. It shall be unlawful for any person to spit upon the floor or any part of any street-car or elevator within the city of Denver. Section 2. Any person violating the provisions of this ordinance shall, upon conviction, be fined not less than three dollars nor more than five dollars for each offense; and the conductors of all street-cars and the pilots of all elevators are hereby authorized and empowered to enforce the terms of this ordinance."

An excellent method of educating the public in regard to the necessity of preventive measures to stop the spread of tuberculosis is the formation of societies for this purpose. They exist now in nearly all civilized countries, and have done some very good work already. These societies are composed of laymen and medical men, and their purpose is usually twofold. The medical members deliver public lectures or compose tracts for distribution. The Pennsylvania Society for the Prevention of Tuberculosis, for example, distributed last year 50,000 tracts entitled "How to Avoid Contracting Tuberculosis," 40,000 tracts entitled "How Persons Suffering from Tuberculosis Can Avoid Giving the Disease to Others," and 10,000 tracts entitled "How Hotel-keepers Can Aid in Preventing the Spread of Tuberculosis." This year, a circular, setting forth the "Predisposing Causes of Tuberculosis and How to Avoid or Overcome Them," has been extensively circulated by the same society.

Health
ordinances.

Societies
for the pre-
vention of
tuberculo-
sis.

The second very laudable purpose of some of these societies is the endeavor to establish sanatoria for the treatment of the tuberculous poor. Of the importance of such institutions as preventive factors in the prophylaxis of tuberculosis we will speak directly.

An Association for the Prevention of Consumption and Other Forms of Tuberculosis was founded in London during the summer of 1898, and more recently a similar association was organized in Chicago and one in Durham, England. The object and scope of these associations are similar to those of the Pennsylvania society.

Duties of
the school
physician
in regard to
tuberculo-
sis.

The place where the coming generation should receive most of its hygienic education is the public school. There the children should be taught all that is conducive to health, and also how to avoid all that is unsanitary. The intelligent boy or girl will comprehend, as well as the grown person, why one should not expectorate except in a proper receptacle. In our chapter on prophylactic treatment we will speak more fully of the duty of the public school in the prevention of consumption. I wish to state here only that the school physician (and every school should have one), charged with examining the children every morning for contagious diseases, such as scarlatina, variola, diphtheria, and measles, should, on discovering a child developing tuberculosis, insist upon the exclusion of this pupil from the public school. Besides being a menace to the other pupils, the child will have no chance of getting well while daily attending school in a crowded classroom.

Lack of
hygiene in
railway-
and street-
cars.

Quite an important factor in the propagation of tuberculosis has always seemed to me the unhygienic mode of construction and management of railway passenger-cars, and especially of the sleeping-cars, which are extensively used in the United States by pulmonary invalids in search of warmer climes. The unsanitary arrangement of these sleeping-cars must be evident to any one who has given the matter attention. Only a few months ago, when going south, I had three traveling companions in the more advanced stages of pulmonary tuberculosis, one unable to leave his berth during the daytime. They were all male patients, and with them the rest of the male passengers, the conductor, the trainman, and the colored porter enjoyed the privilege of one drinking-glass. The patients coughed and expectorated a good deal, sometimes hitting and sometimes missing the small hole in the flat cuspidor, which contained no liquid whatsoever. One may draw his conclu-

sions from this as to the safety of the innocent traveler who enters this car having a slight bronchitis, being in a condition of accidentally enfeebled health, or with a natural predisposition to consumption. A few days later I returned in the same car, and I am sure it had not been disinfected since I traveled in it southward.

Now, I am told that it is impossible to hinder a consumptive from entering a Pullman car, and that if there were a law whereby he could be prevented from doing so it would be well-nigh impossible to enforce it. I grant this to be true, but if our wealthy railroad corporations owning lines which habitually carry consumptives to and from health resorts could be induced to run ambulance-cars, especially adapted to the purpose, a good deal of danger now existing would be done away with. If these ambulance-cars would offer to the traveling consumptive only twice the ordinary breathing-space, and if the railroad company would be magnanimous enough to have a trained nurse in charge of each car, the accommodations thus offered would be eagerly sought by all invalids; even an additional price would not deter the average patient from making use of this mode of travel, which would certainly lessen materially the many discomforts from which he has to suffer in the ordinary sleeping-car. Wire mattresses, leather cushions, linen curtains, special cuspidors, and linoleum instead of carpets, with better ventilation generally, could make of such a "Pullman" a model ambulance-car, easily disinfected, and a credit to the respective company. But a regular, thorough cleaning and disinfection of all passenger-cars, even of our street-cars, at stated intervals should be made obligatory.

I am happy to learn that Mr. E. A. Jewett, the Assistant General Superintendent of the Pullman Palace-Car Company, has recently issued directions for disinfecting the Pullman cars by formaldehyde vapor.

Equally important seems to me the regular disinfection of all localities in which large gatherings take place, such as theatres, churches, music-halls, etc. I learn that some of the New Orleans theatres have already distinguished themselves by the happy innovation of disinfecting their entire building, after each performance, with formaldehyde gas. This practice is certainly most highly to be recommended, and should become obligatory in all civilized communities.

Disinfection of theatres, etc.

Street
sweeping
and trained
dresses.

Streets should never be swept without having been previously thoroughly sprinkled. Professor Schrötter calls the sweeping of unsprinkled streets and its accompanying raising of clouds of dust a crime toward one's fellowmen.

But, to my mind, equally dangerous is dame Fashion, when she decrees that our ladies shall wear long or trained street-dresses. To walk and breathe behind a lady dragging her dress over dusty, dirty sidewalks, often dotted with deposits of buccal, bronchial, and pulmonary secretions, sometimes containing the various pathogenic microbes, at others mixed with the juice of the leaves of *Nicotiana tabacum*, must be dangerous to the health of every one. How I pity the poor woman who is afterward obliged to clean these skirts, soiled with an accumulation of filth, dust, and, alas! too often with disease-producing germs! If our ladies will not soon awaken to the danger of this mode of dress, I should certainly favor city ordinances prohibiting the wearing of trailing dresses in public streets.

Disposal of
the dead.

A chapter on prophylaxis of tuberculosis would not be complete without mentioning the danger arising from the present most universal mode of the disposal of the dead. In connection with the disposal of the sputum, I have already referred, on page 50, to the experiments of Lortet and Despeignes, whereby it was demonstrated that earth-worms are capable of ingesting and ejecting the tubercle bacilli without the micro-organisms losing their virulence. Other experimenters, such as Galtier,¹ of Lyons, showed that the bacillus of tuberculosis resisted putrefaction for several months, Gärtner² buried the bacillus for one year, and it retained its infectious property, and Schottlious even claims that it resisted putrefaction for two years. In view of these and numerous other proofs of the danger of burying those who have died from tuberculous diseases, the Third Congress for the Study of Tuberculosis, held in Paris in 1894, adopted resolutions asking for obligatory disinfection of the bodies of diseased tuberculous individuals. A motion for recommending obligatory cremation of such bodies was not carried. Leaving the religious objection to cremation out of consideration, it seems to me that the objection raised from a medico-legal standpoint (inability to discover poison after cremation)

¹ Galtier, "Congrès pour l'étude de la Tuberc.," p. 213, Paris, Oct., 1893.

² Gärtner, Congress, Berlin, 1887.

can hardly have any weight in a case of death from a chronic tuberculous disease. As one of the means of stamping out tuberculosis in the human race, I would certainly favor the cremation of all bodies of individuals having died of a tuberculous disease. Thalassic submersion as a means for the disposal of the dead seems also preferable to the methods now most universally in vogue.¹

We have not yet touched upon the social causes in the propagation of tuberculosis. These are numerous, but we will speak only of those which can be remedied by the sanitary authorities. Dr. Hermann Weber, of London,² in a very able paper read before the Tenth Medical Congress in Berlin, on "The Influence of Climate, Soil, and Social Conditions on the Occurrence and Course of Pulmonary Tuberculosis," speaks of the danger of badly ventilated workrooms and factories, where all sorts of dust is inhaled, unhealthy sleeping-rooms, etc., in the furtherance of this disease. Promiscuous spitting should be especially prohibited, and appropriate spittoons, such as Predoehl's, should be placed in sufficient numbers in all factories, workshops, etc.

Some social causes in the propagation of tuberculosis.

A sanitary supervision of factories, workshops, and stores, with a view of securing hygienically constructed and managed places where the workers have to toil, is, of course, essential. In all such industries where the inhalation of organic or metallic dust seems to be inevitable, the workers should be provided with respiratory masks, such as are in use in some of the factories in Europe.

The regulation of working-hours, especially for women and children, will also lead to a reduction of the mortality from tuberculosis. No one is more prone to become consumptive than the overworked individual whose environments are the contrary to what is considered sanitary.

Syphilis is not infrequently a predisposing cause to pulmonary tuberculosis. To regulate prostitution, and thus diminish the danger of venereal infection, by humane but strict laws, must, of necessity, become a portion of the public prophylaxis of consumption.

Alcoholism predisposes to pulmonary tuberculosis to a still higher degree. Children of alcoholic parents are particularly susceptible

¹ H. D. Lichty, "Journal of American Med. Association," Nov. 26, 1898.

² Weber, H., "Über den Einfluss der klimatischen Boden- und gesellschaftlichen Verhältnisse auf den Verlauf der Lungentuberkulose, etc.," "Münchener med. Wochenschrift."

to tubercular diseases. Legrain, in his excellent work on "*Dégénérescence et Alcoolisme*," says that he found tuberculosis prevailing 32 times in 215 alcoholic families. To combat alcoholism must be the work of the statesman and sanitarian. With the diminution of the consumption of alcohol there will be a corresponding reduction in the mortality from pulmonary tuberculosis.

The following table, compiled by Archibald Kerr Chalmers, M.D., D.P.H.,¹ showing the comparative mortality of individuals, occupied in the various pursuits of life, will be the best guide to the sanitary authorities as to where intervention is most needed:

	PHTHISIS.	OTHER DIS- EASES OF RESPIRATION.	BOTH TOGETHER.	PER CENT. OF PHTHISIS TO ALL DIS- EASES OF RESPIRATION.
Agriculturist,	106	115	221	48.0
Engraver (Artist class),	146	133	279	52.3
Shopkeeper,	172	178	350	49.1
Butcher,	195	209	404	48.3
Commercial Clerk,	218	172	390	55.9
Watchmaker,	243	193	427	54.8
Saddler,	248	169	417	59.5
Shoemaker,	256	181	437	58.6
Draper,	260	181	441	59.0
Tailor,	271	195	466	58.2
Hairdresser,	276	213	489	56.4
Tobacconist, Tobacco Manu- facturer,	280	181	461	60.7
Hatter,	301	210	511	58.9
Musician,	322	200	522	61.7
Bookbinder,	325	218	543	59.9
Printer,	326	214	540	60.4

Coal-smoke
nuisance.

In some cities vigorous measures against the production of quantities of coal-smoke would doubtlessly render the atmosphere purer and the diseases of the respiratory organs rarer. In England there exists a Coal-smoke Abatement Society, which has for its object to combat the smoke nuisance and to enforce existing laws against black smoke. They are trying now to have a law passed making it illegal for any house to be built without being fitted with proper smoke-consuming appliances.

Damp, badly ventilated, and dark habitations seem to favor the development of tuberculous diseases, and a well-drained spot with

¹ "The Causation of Tuberculosis and its Prevention by Legislation," "The Practitioner," London, June, 1898.

porous soil will always be the best place to build a dwelling, hospital, or sanatorium for consumptives. Another urgent need in our large cities, as urgent as sanatoria for the consumptive poor, is model tenement houses. So long as the poor are housed by hundreds in dark, filthy, and badly ventilated buildings, so long will it be impossible to stamp out consumption.

Of what great importance it is to our rising generation that only the most sanitary schools and colleges should be built! We should be as anxious to give our children, young men, and young women, during their school life, just as much opportunity of developing a sound, vigorous body as of obtaining culture and knowledge.

CHAPTER VI.

SANITARY LAWS CONCERNING THE PREVENTION OF BOVINE TUBERCULOSIS.

We come now to another important class of preventive measures to combat the spread of tuberculosis in man ; I speak of those directed toward the suppression of tuberculosis in our domestic animals, especially in cattle.

The danger from tuberculous meat and milk has been, I fear, underestimated in years past. Many authors have considered, and consider yet, the dissemination of the germs contained in the carelessly deposited sputum of tuberculous patients the only important factor in communicating the disease to others ; and I am willing to admit that I, also, formerly adhered to the same opinion. But I recently undertook to trace, in as many cases as it was possible from the published history, the etiology as to antecedents, environments, and personal and family history, and I was astonished to find in how large a number one was justified to exclude the inhalation of bacilli as the etiological factor. A farmer, cowboy, gardener, wood-chopper, or any other individual living in the open air most of the time, residing in an isolated district where consumption is rare, if not unknown, with no family history of tuberculosis, sickens and dies of phthisis pulmonalis. Now, while it is true that primary intestinal tuberculosis is of relatively rare occurrence in the adult, we can account for this by the fact that he rarely takes raw or unsterilized milk as his exclusive nourishment, which may be the case with an unfortunate child whose delicate intestinal epithelium, as we explained before, becomes the abiding-place of the tubercle bacillus contained in countless quantities in every meal he gets. In the adult the ingested bacillus seems, in the majority of cases, to pass through the lymphatic system into the circulation of the blood, to find its favorite lodging-place in the badly ventilated apices of the lungs.

It is well known that the bactericidal quality of the gastric

secretions is insufficient in regard to the germ of tuberculosis. The only defense against this mode of invasion seems to lie in the good phagocytic power of the blood of the healthy individual. Now, when we consider that milk, butter, and meat of cattle constitute most important and most universally used articles of food for man, and how relatively recently laws in regard to tuberculosis have been enacted at all, and in how many States such laws do not exist or are but feebly enforced, I think it is not surprising when, in looking into the exact etiology of many cases of pulmonary tuberculosis, we find that a very large number must have been caused by the ingestion and not by the inhalation of the bacillus.

After arriving at this conclusion I was much gratified, when on a recent visit to Dr. von Ruck's sanatorium in Asheville, North Carolina, to hear his opinion in this matter. He told me that, to judge from the carefully kept history of many thousand cases from all over the United States, which have come under his observation, the majority of cases of pulmonary tuberculosis, in his opinion, had their origin in the ingestion of tuberculous food of some kind. Dr. F. W. Smith, of the Tuberculosis Committee of the State Board of Health of New York, whose experience in the matter of prophylactic measures in regard to tuberculosis has been considerable, seems to be of a similar opinion, for he writes me: "The first great step toward the prophylaxis of tuberculosis in man is to stamp out the disease in cattle." Dr. Martin, of the Royal Commission of England, says: "The milk from cows with tuberculous udders possesses a virulence which can only be described as extraordinary."

Even the geographical distribution seems to point to the fact that the bovine race is in a large measure responsible for the prevalence of tuberculosis among men. In a very able paper, read before the American Health Association, at the twenty-fifth annual meeting, held at Philadelphia on October 26 to 29, 1897, Dr. M. P. Ravenel, of the Veterinary Department of the University of Pennsylvania, showed that in northern Norway, Sweden, Lapland, and Finland, where reindeer constitute the bulk of farm animals; about Hudson Bay and in the islands of the Pacific, where no cattle exist; in the Scottish Hebrides, Iceland, and Newfoundland, where there are only few cattle, tuberculosis is far less prevalent in man. Particularly dangerous, on the contrary, seems to be the regions where cattle are housed and the people live in close proximity to them, as, for

Geographical distribution of bovine tuberculosis.

example, in Italy. This condition caused Perroncito to call tuberculosis "the scourge of man and beast."

It is estimated that in the State of New York there are at this time no less than 75,000 tuberculous cows.¹ I am not prepared to give other exact statistics. I think, however, it is usually estimated that at least five per cent. of all milch-cows are tuberculous. But among some herds of high-bred cattle not infrequently fifty per cent. are found to be suffering from tuberculosis. Let us, then, in our war against this disease, divide our attention equally between the bacilli which may be ingested and the bacilli which may be inhaled.

Most European governments have realized the importance of concerted action in this matter. England has its Royal Commission to investigate the spread of tuberculosis in domestic animals; l'Académie Nationale de Médecine of France has its permanent Section on Veterinary Medicine, which has done much in the direction of bovine legislation; Germany has most rigorous laws and regulations in connection with bovine tuberculosis.

Tuberculosis laws in the United States.

Here in the United States, owing to our geographical and political situation, we have no uniform laws regarding bovine tuberculosis, much less regarding tuberculosis in man. To ascertain the true condition of prophylaxis in regard to tuberculosis, I addressed, last year, letters of inquiry to all the secretaries of the State boards of health of all the States and Territories of the Union, and to the health officers of forty of the largest cities, and reported the results of my inquiry to the Section on State Medicine at the Forty-eighth Annual Meeting of the American Medical Association.² I quote the following from my report:

Alabama.—No laws or regulations concerning tuberculosis in man or beast, and no circulars issued.

Arkansas.—No laws, regulations, or circulars concerning tuberculosis. Dr. Jennings, the executive officer, writes that the State not having made any appropriation, the board is handicapped for want of funds.

¹ Cassidy and Smith, "Tuberculosis: It is the Duty of the State to Suppress the Greatest Destroyer of the Human Race." New York, February, 1897.

² Knopf, "The Present Status of Preventative Means against the Spread of Tuberculosis in the Various States of the Union Critically Reviewed," "Journal of the Amer. Med. Assoc.," Oct. 30, 1897.

California.—Good bovine laws and regulations; circular issued on consumption.

Colorado.—Good bovine laws and regulations, and a special circular, "How to Prevent the Spread of Consumption in Colorado."

Connecticut.—Good bovine laws enforced by the State Board of Agriculture, and a circular on "Consumption: Its Cause and Means of Prevention."

Delaware.—Circular on the prevention of consumption.

District of Columbia.—Only one law in regard to tuberculosis, which forbids the sale of milk that may be tuberculous. No circulars or public notices.

Georgia.—There was formerly a State board of health, but it has been allowed to become extinct for lack of appropriation.

Idaho.—No State board of health. Provision is made for the appointment of health officers by the various boards of county commissioners, but they are answerable to the local authority only.

Illinois.—The board has never passed any laws or resolutions concerning tuberculosis, and no circulars have been issued.

Indiana.—No bovine laws yet, but the question is agitated. The board issues two thousand quarterly bulletins free to all county, city, and town health officers, and to others who may subscribe for them.

Iowa.—The board is very active in educating physicians and laity in regard to tuberculosis, and is enforcing its bovine laws with vigor.

Kansas.—No laws, regulations, or circulars concerning tuberculosis in man or beast. The Legislature failed to make any appropriation and the State veterinary office is abolished.

Kentucky.—For want of appropriation the board has undertaken no work in regard to bovine tuberculosis, but a circular on consumption has been issued.

Louisiana.—Circulars are sent to physicians, and stations for the free examination of sputum have been established, but the attempts of the board to secure legislation in regard to bovine tuberculosis have been thwarted by concert of action on the part of the ignorant and prejudiced Creoles, who have almost entire control of the dairy business.

Maine.—The cattle commissioners are authorized to slaughter

tuberculous cattle and reimburse the owners, and the board has issued a circular on consumption.

Maryland.—No laws, regulations, or circulars on tuberculosis.

Massachusetts.—Five cattle commissioners appointed by the governor are entrusted with the suppression of bovine tuberculosis. A circular on the best means of preventing consumption is issued.

Michigan.—The State Live-stock Commission is intrusted with the work concerning the suppression of bovine tuberculosis. Circulars for public instruction are issued. September 30, 1893, resolutions were adopted to include consumption in the official list of diseases dangerous to the public health.

Minnesota.—Good bovine laws. I received no report in regard to provisions concerning tuberculosis in man.

Mississippi.—No laws, regulations, or circulars concerning tuberculosis in man or beast. With the reorganization of the board better work is hoped for.

Missouri.—No answers to my inquiries, but I learn from the daily paper that the State board recommends public lectures on the question in the more populous centres, and all pupils of the public schools throughout the State be given a course of instruction in the causes of consumption and means by which it may be prevented.

Montana.—No State board of health.

Nebraska.—The board at present is a mere licensing body without sanitary powers.

New Hampshire.—No special regulations on the prevention or restriction of tuberculosis, but some papers on the subject have been printed. In 1891 the Legislature enacted a law creating a State Board of Cattle Commissioners.

New Jersey.—The State Board of Agriculture enforces the bovine laws, and a circular on consumption has been issued.

New Mexico.—The territorial board has noticed the increase of phthisis among natives of the Territory and has traced many cases to an exposure to possible infection, New Mexico being a favorite resort for consumptives. Circulars on consumption are profusely distributed, and last year the board passed resolutions encouraging the testing of domestic animals with tuberculin.

New York.—Good bovine laws not very rigidly enforced because the State appropriation is small. Most efficient work was done at

first by the Tuberculosis Committee of the board, but there was no appropriation last year, in spite of the fact that it has been demonstrated that there are at this time 75,000 tuberculous cows in the State.¹ Circulars like those of the New York City board have been issued. To New York belongs the credit of having done the pioneer work in educating the public to the dangers of tuberculosis. The State board requests all local health officers to register name and address of every person suffering from tuberculosis within their respective jurisdictions.

North Carolina.—No laws, regulations, or circulars concerning tuberculosis in man or beast.²

North Dakota.—No laws, regulations, or circulars concerning tuberculosis in man or beast.

Ohio.—No bovine laws. A circular on the prevention of consumption has been issued.

Oklahoma.—There is a law prohibiting the sale and use of milk from cows not in proper condition of health. Nothing else is done in regard to the prevention of tuberculosis.

Oregon.—No State board.

Pennsylvania.—The State Live-stock Sanitary Board is entrusted with full power to suppress bovine tuberculosis. The board of health has passed resolutions that tuberculosis be added to the list of communicable diseases dangerous to the public health. Circulars are issued and the Pennsylvania Society for the Prevention of Tuberculosis is in a flourishing condition, although it does not receive any aid or encouragement from the State.

Rhode Island.—Circulars are freely issued. Sputum is examined free of charge, and \$10,000 yearly is expended to enforce bovine regulations.

South Carolina.—No bovine laws. Some years ago circulars were printed and distributed, but, no more appropriation for this purpose having been forthcoming, nothing is now done.

South Dakota.—There is a law providing for the destruction of

¹ Cassidy and Smith, "Tuberculosis: It is the Duty of the State to Suppress the Greatest Destroyer of the Human Race."

² And to this State flock, year in and year out, thousands of tuberculous invalids in search of health. During the discussion on this subject at the meeting of the New York Academy of Medicine, of May 5, 1898, Dr. John H. Girdner said that a year ago he had experimented with tuberculine among the cattle in the mountains of North Carolina, and had found them tuberculous almost without exception.

tuberculous animals and carcasses; nothing concerning tuberculosis in man. Provision is hoped for from the next Legislature.

Tennessee.—Circulars on the prevention of tuberculosis in man and beast have been issued. There are bovine laws, but owing to want of funds the board has been deterred from formal action up to this time.

Texas.—The quarantine department is the highest sanitary authority. Its powers are limited to epidemic diseases. Circulars on tuberculosis have been sent to physicians. There are no bovine laws.

Utah.—No board of health or any organization of a similar kind whatsoever.

Vermont.—No answer, but I learn indirectly that this State kills tuberculous cattle and recompenses the owner.

Virginia.—Bovine laws are enforced by the board of control of the experimental station of the Virginia Agricultural and Mechanical College at Blacksburg. Circulars on the restriction of consumption are issued.

West Virginia.—No bovine laws. Circulars on consumption have been issued.

Wisconsin.—The board of health and the State veterinarian cooperate in destroying milch-cows that are tuberculous. Circulars on tuberculosis in man are issued.

Wyoming.—No State board of health. During the legislative sessions of 1895 a bill was introduced to create one, but it was not passed. Sanitary regulations are left to the cities, some of which have boards appointed by ordinance.

This gives us: Fourteen States which have bovine laws and regulations and in which circulars are issued for public instruction in regard to tuberculosis in man, viz.: California, Colorado, Connecticut, Iowa, Maine, Massachusetts, Michigan, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, Virginia, and Wisconsin; two which have bovine laws, but where apparently nothing is done to stop the spread of tuberculosis in man, viz.: Minnesota and South Dakota; one which has bovine laws but cannot enforce them for lack of funds, and where thus far the board has only issued circulars on the prevention of tuberculosis in man and beast, viz.: Tennessee; two (the District of Columbia and Oklahoma Territory) which have a law prohibiting the sale of tuberculous milk, but nothing else concerning tuberculosis in man

or beast; eight which issue circulars of instruction concerning tuberculosis in man, but where nothing is done in regard to bovine tuberculosis, viz.: Delaware, Indiana, Kentucky, Louisiana, New Mexico Territory, Ohio, Texas, and West Virginia; nine where nothing is done to stop the spread of tuberculosis in either man or beast, viz.: Alabama, Arkansas, Illinois, Kansas, Maryland, Mississippi, North Carolina, North Dakota, and South Carolina; seven which have no boards of health, viz.: Georgia, Idaho, Montana, Nebraska, Oregon, Utah, and Wyoming; five from which I have received no answer, viz.: Florida, Missouri, Nevada, Vermont, and Washington.

To the letters addressed to the health officers of forty of our largest cities I have received twenty-nine answers. In one-third of these it was stated that nothing at all had been done concerning the prophylaxis of tuberculosis.

This state of affairs speaks for itself and shows that as a nation we have a most limited protection from tuberculosis in man and beast.

Let us consider for a moment the injustice done to States with good laws in regard to bovine tuberculosis by those which have no such laws. Where interstate traffic exists it will be well-nigh impossible for the States with good sanitary laws to suppress bovine tuberculosis within their borders. The following incident, which I have from a reliable source, will show a danger and injustice to which a State with good laws is no doubt frequently exposed: A farmer in a State with no laws to suppress bovine tuberculosis enters into a compact with a friend residing in a neighboring State where the government kills all tuberculous cattle and recompenses the owner; all the worthless cattle which he can procure are driven across the line to the friend. At the next visit of the State veterinary surgeon these cattle are found tuberculous, ordered killed, and, considering their real value, handsomely paid for. The farmer and his friend divide the profit. This may be the first direct loss in money to the State with good laws, but how many times may not these diseased cows, secretly imported, be the cause of infecting whole herds of valuable cattle? And yet the citizens of the State with good laws in regard to tuberculous cattle, though imposed upon, are to be envied; for the State with no such laws is an unsafe place to live in. The following extract from the "Eighth Biennial Report of the Iowa State Board of Health" will show how true this

How States
with good
bovine laws
suffer from
those with
none.

is: "Some time since the State Veterinary Surgeon found a lot of cattle which he condemned as tuberculous, placing them under quarantine and expecting in a day or two to slaughter them. Upon his return he found that the cattle had been sold to be shipped out of the State for food." The seller claimed that he had fully made known the condition of the cattle to the buyer, and thus the law could not reach him.

To effectually combat tuberculosis in cattle and other domestic animals, the federal government is alone capable to do the work, and should have in this respect equal jurisdiction over all the States and Territories. Much excellent educational work has already been done by the Bureau of Animal Industry under the direction of its distinguished chief, Dr. D. E. Salmon. However, the need of concerted action must certainly be felt more in the United States than in other countries.

While each country and State may have to frame its bovine laws and regulations in accordance with the demands of its geographical, climatic, and perhaps also its political situation, there are some which should be common to all. From a careful perusal of extensive literature on the subject, and an effort to make myself acquainted with the practical workings of the many different laws, regulations, and recommendations concerning the restriction of tuberculosis in cattle, I may suggest a few points which should form part of the rules essential to the prophylactic work instituted by any government in this respect:

Inspection
of cattle.

1. There should be a central bureau, from whence the work of the sanitary inspectors, especially educated for their duties, may be directed.

2. There should be an inspection of all cattle at regular intervals, besides, of course, always upon the demand of the owner.

Regarding the manner in which the inspection should be carried on, I have not found in all the literature anything more practical and more thorough than the directions given by Professor Leonard Pearson, the distinguished State Veterinarian of the State of Pennsylvania, and I take great pleasure in reproducing them *in extenso*.

"DIRECTIONS FOR INSPECTING HERDS FOR TUBERCULOSIS.

"Inspection should be carried on while the herd is stabled. If it is necessary to stable animals under unusual conditions or among unusual surroundings that make them uneasy and excited, the tuberculine test

should be postponed until the cattle have become accustomed to the conditions they are subjected to, and then begin with a careful physical examination of each animal. This is essential, because in some severe cases of tuberculosis no reaction follows the injection of tuberculine, but experience has shown that these cases can be discovered by physical examination. This examination should be complete and include a careful examination of the udder, and of the superficial lymphatic glands and auscultation of the lungs.

"Each animal should be numbered or described in such a way that it can be recognized without difficulty. It is well to number the stalls with chalk and transfer these numbers to the temperature sheet, so that the temperature of each animal can be recorded in its appropriate place without danger of confusion. The following procedure has been used extensively and has given excellent results:

"(a) Take the temperature of each animal to be tested at least twice, at intervals of three hours, before tuberculine is injected.

"(b) Inject the tuberculine¹ in the evening, preferably between the hours of 6 and 9. The injection should be made with a carefully sterilized hypodermic syringe. The most convenient point for injection is back of the left scapula.

"Prior to the injection the skin should be washed carefully with a five per cent. solution of creoline or other antiseptic.

"(c) The temperature should be taken nine hours after the injection, and temperature measurements repeated at regular intervals of two or three hours until the sixteenth hour after the injection.

"(d) When there is no elevation of temperature at this time (sixteen hours after injection) the examination may be discontinued; but if the temperature shows an upward tendency, measurements must be continued until a distinct reaction is recognized, or until the temperature begins to fall.

"(e) If a reaction is detected prior to the sixteenth hour, the measurements of temperature should be continued until the expiration of this period.

"(f) The thermometers used for this work should be accurate, and if several are used they should be compared before the examination is commenced.

"(g) If there is an unusual change of temperature of the stable, or a sudden change of weather, this fact should be recorded on the report blank.

"(h) If a cow is in a febrile condition when the initial temperatures are taken, tuberculine should not be used on her, because in this case the temperature curve is irregular and the result of the test uncertain.

"(i) Cows should not be tested within a few days before or after calving, for experience has shown that the result at these times may be misleading.

"(j) The tuberculine test is not recommended for calves under three months old.

¹Average dose: 0.25 c.c. In diluting for an injection a 10 per cent. solution of tuberculine is made by adding 9 parts of a 1 per cent. solution of ac. carbol.

"(k) In old, emaciated animals and in retests use twice the usual dose of tuberculine.

"In reporting upon the examination of the herd, the large temperature sheets should be filled out and returned, together with a more detailed record for each animal that proves to be tuberculous. This detailed report should be made out on the individual report-blanks provided for this purpose.

"Condemned cattle must be removed from the herd and kept away from those that are healthy.

"In special cases inspectors may be directed to destroy and make post-mortem examinations upon the condemned animals as soon as they are recognized, but this must only be done when directions to this effect are given in the original letter of advice.

"In making post-mortems the carcasses should be thoroughly inspected, and all of the organs mentioned on the blank for reporting this work should be examined."

3. There should be a thorough destruction of all tuberculous meat, etc., and a most thorough disinfection and cleaning of the stables and all utensils which may have come in contact with the tuberculous animals. The owner of the cattle should be instructed in regard to the sanitary arrangements to prevent, as far as possible, a new outbreak of the disease. He should be especially instructed as to the precaution to be taken before introducing new animals into the herd.

4. There should be a just compensation for his loss according to the actual value and condition of the animals at the time of appraisement.

5. There should be a careful examination of all imported cattle and the strict exclusion of all tuberculous animals.

6. While several authors caution against the employment of a consumptive to help about cattle or in the dairy, I have failed to discover anything in the literature on the subject calling attention to the fact that the presence of any disease such as diarrhoea in children or adults, persistent cough, bronchitis, pleurisy, local badly healing sores in any one on or about the premises, might lead to the detection of bovine tuberculosis among the cattle of which they had charge, or of which they received milk. I would thus make it compulsory to notify the nearest sanitary authority of the occurrence of any of the above-named diseases, in addition to typhoid fever, scarlatina, diphtheria, etc., on the premises in the vicinity of where milch-cows are kept.

7. A thorough supervision of all the slaughter-houses, milk-

depots, butcher-shops, and all the retail milk-stores is, of course, also one of the vital points to be considered in our strife against tuberculosis in man or beast.

Of the many interesting letters which I received in reply to my inquiries there is one from Indiana which gives, concerning the question of how to solve the problem of combating bovine tuberculosis, such a unique and practical method, without having even resource to the law, that I think it my duty to reproduce here this letter *in extenso*. I am sure my distinguished friend, Dr. Hurty, will pardon me for doing so, since the example set by the wise City board of Indianapolis can only be productive of much good, and is certainly worthy of emulation:

“OFFICE OF STATE BOARD OF HEALTH OF INDIANA,

“INDIANAPOLIS, February 7, 1898.

“DR. S. A. KNOPF, NEW YORK:

“*Dear Doctor*: In reply to your favor of February 3d. The subject in which you are so deeply interested is being agitated in this State, but at the present time there are no special hospitals, either public or private, for consumptives. In this city, Indianapolis, a good work toward the suppression of tuberculosis is being done without intervention of law. The City Board of Health induced one of the prominent dairymen to write a letter, requesting that his herd be tested with tuberculine, and also that a sanitary survey be made of his dairy and suggestions be made for sanitary improvements, he promising to destroy all cattle which reacted to the tuberculine test, and to make all sanitary improvements suggested. For this he was to receive a certificate from the Board of Health, simply stating the facts of the case. This, you see, was a true commercial method. The work was done, as above indicated, and immediately the popular demand arose for the milk supplied from tuberculine-tested animals. Every dairy supplying milk to this city has now been tested and sanitary surveys made, as above. About six per cent. of the dairy cattle have been killed, and in every instance it was discovered that the tuberculine test was accurate and absolute. This method seems better than the legal method. Some of the poor dairymen have rebelled somewhat against the loss of their animals, but the answer given them is final and complete—viz., that no matter how poor they are, or what financial injury may be brought to them, still they have no right to furnish milk which will probably produce disease and death. I believe, however, it would not be bad policy for the State to pay, say, one-half the value of the cattle slaughtered on account of tuberculosis. This would be a mere matter of public policy to aid in a consummation which is devoutly to be wished.

“Communications from citizens and physicians have appeared in our local papers advocating public homes for consumptives. We think,

Solving the
tuberculous
milk problem
without the aid
of the law.

therefore, it will not be long before Indiana will be able to report progress in this direction.

"Thanking you, I am very truly yours,

"J. N. HURTY, *Secretary.*"

Tuberculosis in hogs is not infrequent, but the cause of the disease can almost always be traced to the infection from tuberculous bovine products. I quote from Piffard's article in the "New York Medical Record" of April 3, 1897¹:

"The report of the Copenhagen Experiment Station states that at a Danish creamery, where the centrifuge slime was fed to swine, all of these proved tuberculous, and warns against the use of slime for this purpose without its being previously boiled or heated toward the temperature of boiling water. The prevalence of tuberculosis among swine in certain parts of Germany has been attributed to this system of feeding."

Many other examples pointing in the same direction might be quoted. The rare instances of tuberculosis in horses, goats, dogs, etc., can doubtlessly always be traced to an infection by tuberculous products from either man or cattle.

¹ Piffard, "On the Tuberculosis Question."

CHAPTER VII.

PREVENTIVE TREATMENT.

In the previous chapters we have spoken of the measures which might be instituted to prevent the germ of tuberculosis from entering the human system through either the respiratory or the digestive tract, or through inoculation. But even with the most severe laws and regulations the bacillus tuberculosis will not vanish completely. For a long time to come there will be only too many chances to contract tuberculosis through the carelessness of consumptives, or the unscrupulousness of meat-dealers, farmers, or dairymen, or through the bacilli that, even with the best intentions on the part of the sanitary authorities and their co-workers, are likely to escape detection. What, then, can we do to protect our system against the invasion of this deadly micro-organism?

Our bacterio-therapeutists have thus far failed to give us any remedy which we might safely inject as an immunizing agent to prevent the development of tuberculosis. I should rejoice if such a boon would still be in store for mankind. However, we need not despair in the meantime. If the teachings of modern phthisio-therapeutists are followed, even the child of tuberculous parents may become a strong, healthy man or woman, and the accidental inhalation or ingestion of the tubercle bacilli will not suffice to make a consumptive of him or her. For, as we have already stated, it is the weak and enfeebled organism which becomes the easy prey of the bacillus tuberculosis. One in fair health, living a regular and hygienic life, has little to fear. The bactericidal quality of his nasal mucous membrane will protect him from harm through the inhalation of the bacilli, while the good phagocitic action of his blood will protect him from harm through the ingestion of tuberculous meat or milk, or from the bacilli which he may have taken in with the dust in the air while speaking or breathing through the mouth.

A predisposition to pulmonary tuberculosis may be inherited or acquired, but in either case the means to overcome this peculiar

Description of an individual predisposed to consumption. susceptibility are the same. Let us examine, for a moment, an individual predisposed to consumption, and we will be better able to understand the reasons for the therapeutic measures which I shall describe. If it be a child he will be either undersized or present an almost abnormal height for his age, with a narrow chest. He will be a bad eater, irritable, nervous, anæmic, with irregular digestive functions, at times constipated, at times suffering from diarrhœa, prone to all the diseases of childhood, and still mentally rarely behind his more robust companions. He is averse to outdoor play, and, owing to his delicate constitution, he is allowed to have his way, and his character is often spoiled.

The adult candidate for pulmonary tuberculosis differs from his younger brother but little; the physique is the same; the peculiar condition of mind is more pronounced; while sanguine at times, anxieties, disappointments, especially unfortunate love affairs, and similar sorrows, often suffice to bring about a rapid development of the disease. In sorrow one eats but little, the arterial pressure is low, the muscular weakness and depressed nervous state make the act of breathing incomplete. The beneficial influence of natural and full breathing does not exist any more; the heart is called on to do more work and a perpetual palpitation ensues. The circulatory disturbances in the lungs impair the nutrition of this organ, and thus the field for the invasion of the bacillus of tuberculosis is prepared.

The decreased power of resistance makes the anæmic individual, in addition, especially prone to acute inflammations of either the mucous or serous membranes, and catarrhal conditions of the upper respiratory organs become alarmingly frequent and inclined to descend into the deeper air-passages. And why do these people take cold so easily and frequently? Because their vasomotor system is impaired, and the slightest change of temperature or insignificant exposure of some part of the body usually covered suffices to hinder the peripheral circulation to the extent of producing congestions and to impair the process of eliminating used-up substances, whose toxicity increases with the length of time they are retained.

It seems evident, then, that the insufficient air-supply to the respiratory organs and the increased susceptibility to the slightest change of temperature are the principal factors in the production of consumptive individuals. Therefore to prevent or improve the

condition caused by an insufficient air-supply we must resort to aërotherapeutics, and to arouse the vasomotor system to a more energetic action we have in hydrotherapeutics not the only, but, considering its salutary secondary effects, the most valuable therapeutic agent.

To prevent pulmonary tuberculosis we must begin with treating the child *in utero*, continue in the lying-in room, nursery, and school-room, and teach the young man or woman to keep the treatment up throughout life. A woman who is to give birth to a child should abandon the corset and tight clothing in time to allow a continued, free abdominal and thoracic respiration. Wiser yet if she never had been addicted to the habit of tight-lacing, for the experiments of Kellogg¹ and Mays have demonstrated that the so-called female or costal type of respiration which prevails among civilized women is the result of their restricting and unhygienic mode of dress, and is not due to the influence of gestation or to a natural difference in the anatomico-physiological growth of man or woman.

Prophy-
lactic treat-
ment
should
begin with
the child
in utero.

For the mother to live as much as possible in pure, fresh air, to take frequent breathing exercises, to avoid crowded assemblies where the air is vitiated, and live, in short, as hygienic a life as circumstances will permit, will have a most salutary effect on the child's future health. The new-born child is in need of pure, fresh air as much as the mother; and the lying-in room and the nursery should always be well ventilated. When the child, in time, is taken for an airing, the thick, almost impermeable veil should be abandoned. These veils, often tightened around the little face, press against the nose and make it difficult for the child to breathe naturally, and the mother wonders why the baby got into the habit of breathing through the mouth.

Frequently, also, mouth-breathing in children, and sometimes in adults, must be attributed to adenoid vegetation in the retro-pharynx, or to enlarged tonsils. These as well as all other causes of obstruction to a free, natural respiration, such as deviated septum, spores, enlarged turbinated bones, hypertrophied mucous membrane, polypus, etc., must be removed if we desire to protect the child or adult from chronic nasal, pharyngeal, and laryngeal catarrhs, so often the forerunners of pulmonary diseases.

Mouth-
breathing.

¹ Kellogg, "Experimental Researches Respecting the Relation of Dress to Pelvic Diseases of Women," "Transactions of the Michigan State Med. Society."

Only after the removal of all possible causes of obstructions in the upper air-passages is a natural physiological respiratory function possible, and only under such conditions can we hope for real benefit from breathing exercises.

I consider the air-bath and sun-bath for children at the earlier age most beneficial. Let the little ones toddle around naked every day for a short time; in cold weather in well-warmed rooms, and in summer in the room bathed by the rays of the sun. They will become less susceptible to colds than if always carefully bundled up.

In localities where it is impossible to prevent the constant inhalation of coal-dust or other irritating substances, a regular nasal toilet with a mild antiseptic solution, or, perhaps, best of all, plain tepid but previously boiled water, should be instituted for children until they are old enough to blow their noses properly.

As soon as the age and intelligence of the child will permit, breathing exercises should be taught to him. He should learn to love them, as the average child likes general gymnastics. The following is a description of the exercises I recommend to all children and adults who breathe faultily, to the anæmic, the predisposed, and to the chronic tuberculous patient who is able to be about and where a modification is not indicated. These are also a part of the gymnastic exercises I should like to see incorporated in the curriculum of all schools, and not only in the selected few. I have prescribed them for years with very satisfactory results, and I can recommend them as practical, efficacious, and easily learned.

Respiratory
exercises.

Presuming that the upper air-passages are in a normal condition, the patient is taught to stand properly—that is to say, straight, chest out, and head erect—and to breathe always through the nose. He takes a deep inspiration slowly, beginning with the abdominal muscles and then expanding the chest to its fullest capacity. During this inspiration he raises his arms from his sides to a horizontal position (Fig. 13). He holds the breath for a moment, and then lowers the arms during the act of expiration, which should be somewhat more rapid.

The second exercise is like the first, except that the upward movement of the arms is continued until the hands meet over the head.

In the third exercise the patient stretches his arms out as in the position of swimming, the dorsal surfaces of the hands touching

each other. During the inspiration the arms are moved outward and finally meet behind the back. They are brought forward again during the expiration. This exercise can be greatly facilitated and made more effective by the patient rising on his toes during the act of inspiration, and descending during the act of expiration. Each respiratory act should be followed immediately by a secondary forced expiratory effort. This is for the purpose of expelling as

Secondary
forced ex-
piratory
effort.

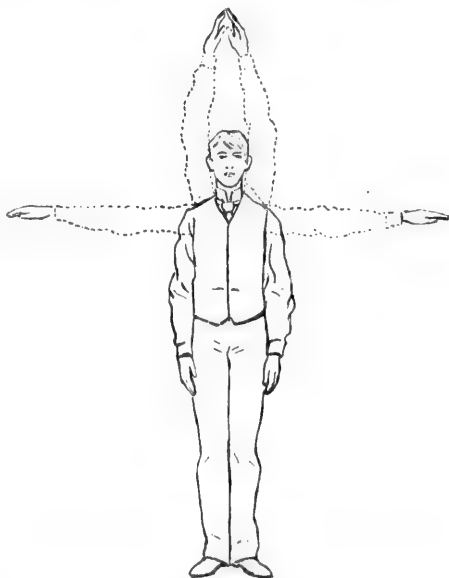


FIG. 13.—FIRST AND SECOND RESPIRATORY EXERCISES.

much of the supplemental air as possible, and may be effectually aided by supinating the arms and pressing the thorax with them.

Considering that the amount of tidal air—that is to say, the volume which is inspired and expired in quiet respiration—is only 500 c.c., the complementary air—the volume which can be inspired after an ordinary respiration—1500 c.c., and the supplemental or reserve air—the amount which can be forcibly expelled after an ordinary respiration—amounts to 1240 to 1800 c.c., one can readily see the

value of respiratory exercises, and also the utility of this second expiratory effort.

Usual seat
of primary
lesion.

The fact that in the majority of cases the tuberculous process begins at the apices has been explained by the supposed bad inspiratory function of this part of the lungs. Now, I agree in this respect with Hanau,¹ and consider the almost universally adopted statement of the deficient inspiratory function of the apices erro-

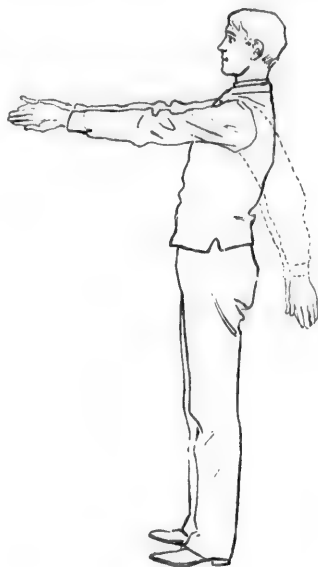


FIG. 14.—THIRD RESPIRATORY EXERCISE.

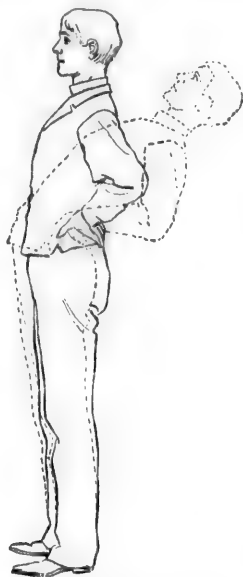


FIG. 15.—EXERCISE FOR PATIENTS IN THE HABIT OF STOOPING.

neous. On the contrary, these portions of the lungs inspire excellently well, almost too well, for dust and all sorts of micro-organisms enter there most easily and are found in large quantities in careful post-mortem examinations. What is faulty is the expiratory function of the apices. A thorough expiration followed

¹ Hanau, A., Zürich, "Beiträge zur Pathologie der Lungenkrankheiten," "Zeitschrift für klin. Medicin," xii, 1887.

by a forced expiratory effort, as described above, is, to my mind, the only possible way to improve this defect and prevent stagnation and congestion, which, as is well known, form excellent media for the development of bacilli.

To consumptives, those predisposed to tuberculosis, and to children who have the habit of stooping, I teach an additional exercise, as follows (Fig. 15): The patient makes his best effort to stand straight; he places his hands on his hips with the thumbs toward the front and then bends slowly backward as far as he can during the act of inspiration. He remains in this position a few seconds while holding the breath, and rises again, somewhat more rapidly, during the expiration.

When the patient is out walking it will, of course, not always be convenient nor possible to do these exercises with the movement of the arms. The patient should, under such conditions, content himself with raising his shoulders and making a rotatory movement backward during the act of inspiration, holding the breath for a moment and then exhaling during a rotatory movement forward, assuming again the normal position. The second respiratory effort can follow this exercise also without attracting any attention.

For all classes of patients, candidates for consumption and bad breathers in general, the rules hold good never to take their breathing exercises when tired or immediately after a heavy meal, never when uncomfortably or tightly dressed, never to continue them to the extent of becoming tired, never to take them in a bad atmosphere, and not to take them at their caprice, but according to the directions of the physician.

One exercise should be taught at a time, and only after it is thoroughly mastered should the physician proceed to teach the next one. I have described them in the order of their difficulty. The first, a simple raising of the arms to the horizontal line during the act of inspiration, requires relatively little effort. The second one, in which the arms describe a circle by being raised outstretched until they meet above the head, requires a more prolonged inspiration and necessarily an increased muscular effort. The third, the swimming exercise, in which the hands should meet behind the back, is the most difficult. The necessary length of time between learning the exercises will depend upon the aptitude, the expansive power, and the general condition of the patient. Some patients can be taught all these exercises within nine or ten days, while with

others months often must intervene before the next exercise can be commenced.

Breathing
exercises at
school.

The breathing exercises at school should be under the direction of the school physician or teacher of physical culture. In summer they should be taken out-of-doors, and on rainy, windy, or too cold days in the school-room, which should be a model of ventilation. To teach the children how to breathe, sit, stand, and walk properly, should be a part of the every-day curriculum. Every school should have its large playground or roof-garden, where, weather and season permitting, the classes should alternately receive their instruction. In rural communities, during the warmer season, instruction in-doors should be the exception, not the rule. Singing and recitation especially should be encouraged out-of-doors. I have found that singing in pure air is an admirable and most useful adjuvant in aërotherapeutics. Barth,¹ of Köslin, who has made a careful study of the effects of singing on the action of the lungs and heart, on diseases of the heart, on the pulmonary circulation, on the blood, the vocal apparatus, the upper air-passages, the ear, the general health, the development of the chest, on metabolism, and on the activity of the digestive organs, has come to the conclusion that singing is one of the exercises most conducive to health. Considering the fact that it can be practised anywhere (when the air is pure) or at any time, without apparatus, it should be much more cultivated than it actually is. The German military authorities, which have the reputation for instituting all exercises which tend to invigorate the soldiers, have of late years encouraged singing during marches of all the troops.

Before closing with the subject of school hygiene, I can not help repeating here the very impressive words of Dr. W. W. Hitchcock,² in his article on the gymnasium as a sanitary measure. Referring to the frequent lack of the development of the thorax, particularly noticeable in those predisposed to pulmonary diseases, he said: "There is no doubt that if as much care were bestowed on our young in seeing that this particular part was developed with that care that the brain receives, tuberculosis would almost disappear."

Finally, it can not be impressed too strongly on the minds of

¹ "Archiv für Laryngologie," 5. "Deutsche Medicinal-Zeitung," Nov. 15, 1897

² Hitchcock, W. W., "The Gymnasium from the Standpoint of the Sanitarian," "Transact. of the Fourth Calif. Sanit. Convention," 1896

consumptives, and those predisposed to the disease, that they should always seek environments where the air is as pure as possible. Lord Beaconsfield's celebrated words, "The atmosphere in which we live has more to do with human happiness than all the accidents of fortune and all the acts of government," have, I think, a special meaning for this class of sufferers.

Lord
Beacons-
field on
pure air.

Hydrotherapeutics, as a measure to prevent pulmonary tuberculosis, tends to develop to a more vigorous action the vasomotor system, and should also be instituted at an early age. A child a few months old can support with impunity a rapid sponging off with cold water, followed by a relatively vigorous friction with a soft Turkish towel after its warm bath. As the child grows older he should not only be taught this use of cold water after his semi-weekly or weekly bath, but he should wash at least the face, neck, and chest every morning with cold water. Better yet if he can accustom himself early to a daily cold douche. The utility of all-the-year-round swimming baths, where old and young of all classes can, gratuitously or for a moderate price, enjoy the salutary effects on body and mind of a good swim, is too well known to need repeating.

Hydro-
therapen-
tics to
strengthen
a predis-
posed
individual.

For anæmic individuals who, as I stated above, are, in the majority of cases, candidates for consumption, a graduated course of hydrotherapeutics seems to act almost as a specific. That there is never any danger from a judiciously applied affusion or douche has been demonstrated by years of practice. And why should there be? All that is necessary is to insure the proper reaction and an education of the skin and nervous system before the classical douche is employed. The surest sign of a proper reaction is the appearance of a red hue of the skin where the water had been applied. No exception should be made, whether the patient is simply predisposed, an anæmic, or a fully developed consumptive; it is always best to begin with a dry massage for several days, and if the skin is particularly dry I prescribe, in addition, inunction with some fatty substance, preferably cod-liver oil. Next, for about the same period of time, comes the friction with pure alcohol; then with half alcohol and water; finally, the friction with water alone. Then comes the cold sponge-bath, the affusion, and at last the douche. The friction with the hands directly in contact with the skin or over a large towel, after the douche, should always be kept up until the patient is thoroughly dry and warm.

Born bad eaters.

Children and young people often develop tuberculosis for no other reason than that they are naturally bad eaters. Kind and persistent urging to eat a fairly hearty meal at least twice a day, combined with discipline in regard to regularity of meals and the proper kind of food; the exclusion of all delicacies and sweetmeats tending to impair the appetite or digestion, associated with a continued course in aëro- and hydro-therapeutics, will make, in a relatively short time, a well and strong individual out of a naturally bad eater. At times, of course, tonics, cod-liver oil, iron, phosphates, etc., may be needed to serve as adjuvants in this treatment.

What has been said of the value of air- and sun-baths—that is, the judicious exposure of the whole cutaneous surface of the body to the air and all except the head to the rays of the sun for very small children (page 82)—is equally true of these bad eaters so long as they remain such. The tonic effects of sun-baths are too often underestimated, and the parents of such children may well take to heart the Persian proverb, "Where the sun and the air do not enter, the physician enters often."

Lack of humidity in indoor atmosphere a cause of nasopharyngeal catarrhs.

The exceedingly dry atmosphere in the majority of our American private dwellings during the winter season is a not infrequent cause of chronic nasopharyngeal catarrhs, so dangerous to predisposed individuals.

Already in 1836, Dr. Reid, of London, remarking upon the ventilation of the House of Lords, said: "When water to the amount of seventy gallons was evaporated into the air at a single sitting, coughing among the members was much diminished." While simple evaporating devices, such as a vessel filled with water and a cloth suspended above it touching the water so as to produce capillary attraction, will answer all practical purposes of rendering the atmosphere sufficiently humid, Dr. Barnes' humidifier has certain additional advantages. With the aid of this instrument, which we will describe in our chapter on the "Treatment at Home," the humidity of the atmosphere in an apartment can be regulated more precisely.

Phthisio-genetic causes.

We must mention yet under prophylactic treatment the particular care which should be taken with patients recovering from diseases which might be called phthisio-genetic. Nearly all eruptive diseases of childhood and adult life, such as measles, scarlatina, variola, typhoid fever, and typhus, leave the patient only too frequently predisposed to the invasion of the tubercle bacilli.

Severe grippe should also be classed with the diseases predisposing to pulmonary tuberculosis. Such patients should be particularly warned not to expose themselves to the possibility of infection. They should lead a most hygienic life, and be careful not to overexert themselves.

As a predisposing cause to pulmonary tuberculosis we have already mentioned syphilis and alcoholism. While individual prophylaxis may in a measure be a protection against these two afflictions, public hygiene and State medicine will have to deal with these subjects, as has been already pointed out in the chapter on Public Prophylaxis (chap. v).

CHAPTER VIII.

VISITS TO SOME OF THE MOST IMPORTANT SANATORIA AND SPECIAL HOSPITALS OF EUROPE, THE UNITED STATES, AND CANADA.

Nothing is more instructive to the physician interested in modern phthisio-therapy than a visit to the sanatoria, special hospitals, and health resorts devoted to the treatment of consumptive patients. As stated in the introduction, I have visited some thirty-odd of such places in Europe and the United States, in order to become acquainted with the best possible methods of treating tuberculous patients.

Since it is not possible for all physicians to undertake such journeys, I shall endeavor, in the following pages, to describe and illustrate some of the most important and interesting institutions which I visited four years ago, preparatory to my French book on sanatoria, and some which I have visited since. I shall also describe a few which have been established more recently. For the information concerning these I am indebted to the respective inspectors of the institutions. Thus, I hope to make this chapter of visits to sanatoria as interesting and complete as possible.

EUROPE.

FALKENSTEIN SANATORIUM.

Falkenstein is the Mecca of phthisio-therapeutists. All those who desire to instruct themselves in sanatorium management and in the treatment of tuberculosis will pay a visit to Falkenstein and to its venerable director, Geheimrath Dr. Dettweiler.

The sanatorium is situated in the village of Falkenstein, about thirteen hundred feet above the level of the sea, on the southern slope of the Taunus Mountains. The valley is protected on the west, north, and east, and opens toward the southeast. On each side rise wooded mountains, which inclose a most beautiful view of the plain. In the foreground lies Cronberg (terminus of the railway to Frankfort), with its castle; and beyond, the broad valley of the

Main, dotted with towns and villages. A little farther to the east the view even extends to the plains of the Rhine.

The institution proper consists of a main building with two wings joining at an obtuse angle so as to inclose a large terrace, and two annexes, united to the main building by covered promenade-galleries, opening toward the south. On the east side, in direct communication with the main building, is the new, elegant dining-hall, and the model kitchen and store-rooms. In the dining-hall, which is 78 feet long, 39 feet wide, and 32 feet high, 200 persons can be comfortably seated. It is well ventilated and in winter is heated by steam.

In the main building on the ground-floor are drawing-, music-, and reading-rooms; the library, with 2000 volumes in English, French, and German; the inspector's office, and the post- and telegraph-offices.

The terrace inclosed by the wings of the main building has an especially protected situation. Around it extend covered verandas provided with curtains, so that even the weaker patients may be able to remain in the open air from morning until night, winter and summer. Similar structures and revolving pavilions are situated near the building, and serve the same purpose. In these and the verandas are placed comfortable, cushioned, cane reclining chairs. These chairs enable the patients to carry out with comfort the main part of the treatment—namely, the prolonged sojourn in the open air.

Through a gallery, 200 feet in length, the eastern annex is reached, which lies immediately on the border of the forest. This building, formerly occupied by the physicians, is now, since the completion of the new structure, exclusively reserved for patients. These rooms are heated by hot-water pipes, as in the lower story of the main building. The halls, main staircase, and corridors are heated by the Bacon system of steam.

To the southwest of the main building, and united to it by a gallery 108 feet long, is the western annex. The basement of this annex contains the bath-rooms and arrangements for the hydro-therapeutic applications, which form part of the treatment. The institution has its own water-supply, derived from springs situated 250 feet above the sanatorium, on the slope of the "Altkönig." The water is excellent, and has a temperature of 50° to 54° F. On the ground-floor are the waiting- and consulting-rooms and the

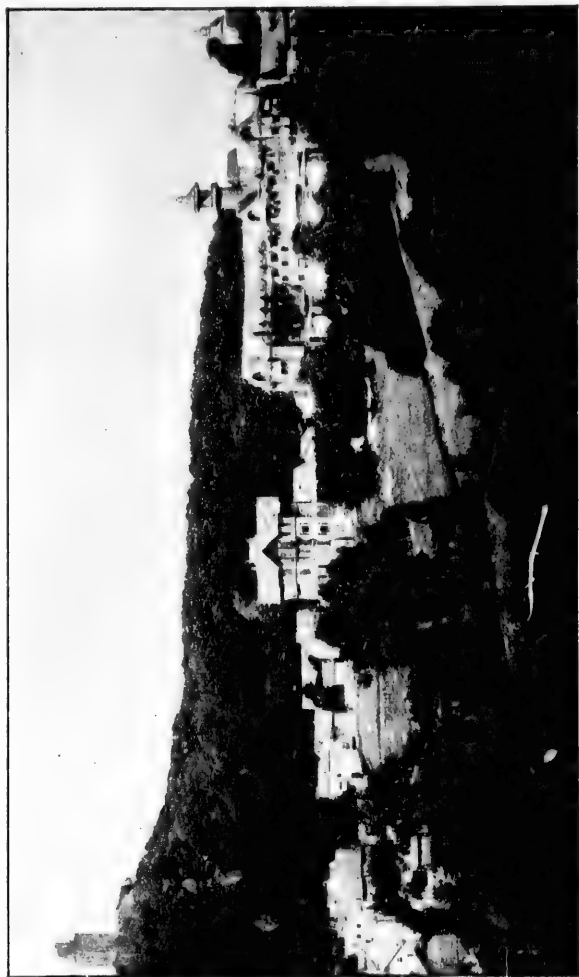


FIG. 16.—FALKENSTEIN SANATORIUM. (General view.)

chemical and microscopical laboratories. The upper floors are occupied by the physicians and their families.

Behind these buildings, forming together a semicircle open toward the valley, are the barns, stables, disinfecting apparatus (Bacon system with superheated steam), and the washing- and drying-rooms. The entire institution is lighted by electricity.

In 1883, W. H. Lindley, C. E., constructed a system of drainage for the institution on the principle of chemical precipitation, with clearing-basins. The system has proved to be most satisfactory.

The sanatorium is surrounded by grounds and woods in which



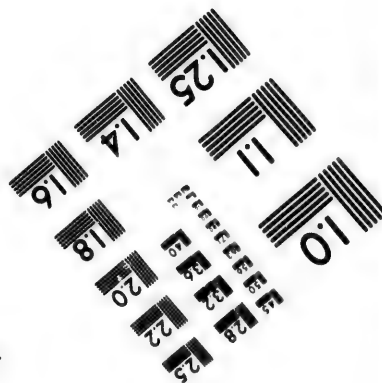
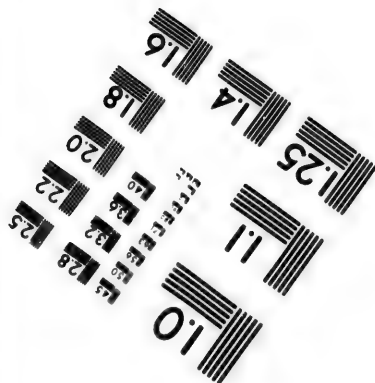
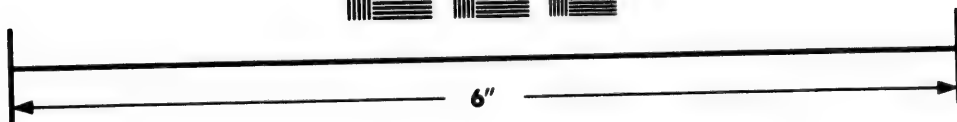
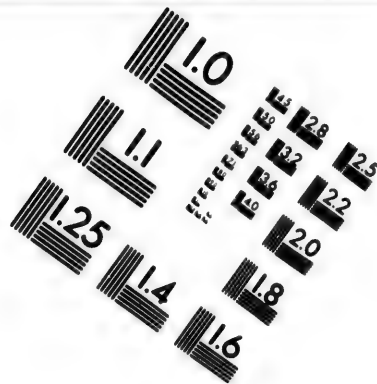
FIG. 17.—VERRANDA AT FALKENSTEIN.

there are many charming walks, and the adjoining mountains afford ample opportunities for pleasant excursions. The climate is essentially that of Central Germany. Its main advantage is its pure atmosphere, free from dust. The variations of temperature are rarely great or sudden, and there is no perceptible fall of temperature at sunset at Falkenstein.

The evenings are characterized, almost the whole year round, by calm and even temperature. In summer they are pleasantly cool, and in winter often the most quiet part of the day.

The institution is open all the year round, and patients are received at any time as far as room permits. During the last year





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the institution was visited by some five hundred patients, quite as many remaining in winter as in summer.

Patients are not permitted to take their meals in their rooms unless so ordered by the physician.

Friends and servants may take rooms in the village if their constant presence with the patient is not required. The more vigorous patients may also, with the consent of the physician, reside in the village. They lose none of their privileges thereby, nor are they released from their obligations as patients of the sanatorium.

The sanatorium was founded in 1874, through the efforts of some Frankfort physicians, with the view of creating in Western Germany, in a healthy, mountainous region easy of access, an establishment for the treatment of those suffering from disease of the lungs. The capital necessary for the enterprize was principally subscribed by wealthy citizens of Frankfort, under the condition that the shareholders should not receive more than five per cent. interest, and that the surplus should be used first for the necessary improvements, and then, as soon as possible, for the founding and maintaining of a sanatorium for poor consumptives. Thus was formed the nucleus of the capital needed to create the now so flourishing institution for the consumptive poor at Ruppertshain.

Since the retirement of Dr. Dettweiler from the position of directing physician, Dr. Karl Hess has become medical director, with Drs. Besold and Pickert as assistant physicians. Dr. Dettweiler still remains the consulting physician of the institution.

The nearest railway-station to Falkenstein is Cronberg, which is about an hour's distance from Frankfort-on-the-Main.

RUPPERTSHAIN SANATORIUM.

Ruppertshain is the first institution founded in Germany for the treatment of the poorer classes of consumptives. It owes its existence to the energy of Geheimrath Dr. Dettweiler, his co-laborers, to the generosity of the wealthy patients of Falkenstein, and to the philanthropic citizens of Frankfort-on-the-Main.

The sanatorium of Ruppertshain is situated at a short distance from the village of Ruppertshain, in the Taunus Mountains. The grounds on which the buildings are constructed cover about twelve acres, and are protected on the north and west by high, wooded hills, which open toward the south. All the buildings are con-

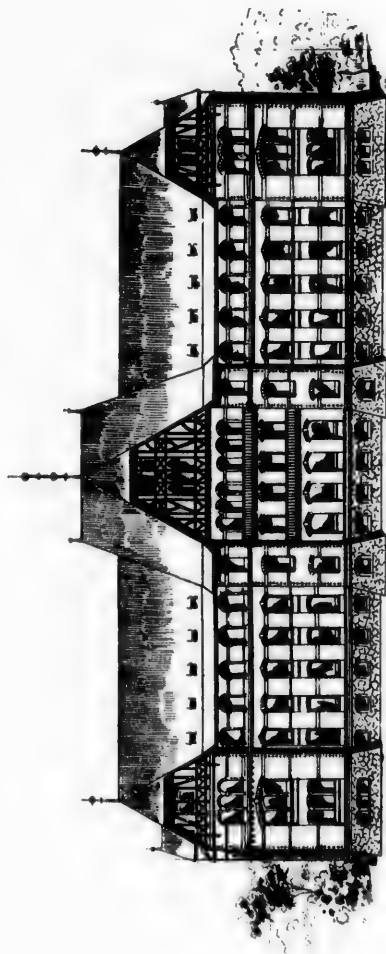


FIG. 18.—MAIN BUILDING OF THE SANATORIUM AT RUPPERTSHAIN.

structed so as to face south or southwest. There is a main building, two pavilions, and two large galleries, sheds, stalls, etc. The main building is three stories high. The ground-floor contains douche-rooms, bath-rooms, machineries, etc. On the next floor are the reception-rooms, music-room, and parlors. The rest of the building is taken up by rooms varying in size; some contain five beds, some three, and some only one. The bedrooms are light and airy, about ten feet high, and the walls are painted. The floors are of inlaid wood, and the ceilings whitewashed. There is no special arrangement for ventilation except the iron rule, "Keep window open day and night." The sanatorium is heated by steam; it has its own water-supply from one of the mountain sources.

There is a division for men and one for women. The institution is under the direction of my former colleague, Dr. Nahm, of Falkenstein, aided by an assistant, and the nursing is done by a Protestant sisterhood. The sanatorium can accommodate about one hundred patients. Additional buildings, to enlarge this capacity and to give a private residence to the medical director, are projected.

While the interior arrangements of the sanatorium at Rupperts-hain are not as elegant and luxurious as in the mother-institution at Falkenstein, everything, though plain, is exceedingly comfortable and practically arranged, so that the hygienic and dietetic treatment can be most carefully carried out.

BREHMER SANATORIUM, IN GOERBERSDORF.

We have already mentioned, in our historical chapter, the event of the founding of the first sanatorium for consumptives, by Dr. Hermann Brehmer, in 1859. This institution, which is considered to-day the largest of its kind in the world, being able to accommodate about 250 patients, had a very small beginning. In 1862 a new building was added, and ever since the institution has grown and prospered. Brehmer selected Goerbersdorf for his sanatorium because he believed in the immunity of this mountainous region, and because he found it best adapted to carry out his ideas of a systematic ascending of graded walks in order to strengthen the small and feeble heart of the consumptive. According to his idea it was the disproportion between heart and lungs—the latter relatively large, the former small and with weak muscular action—which was the main etiological factor in the production of pulmonary tuberculosis.

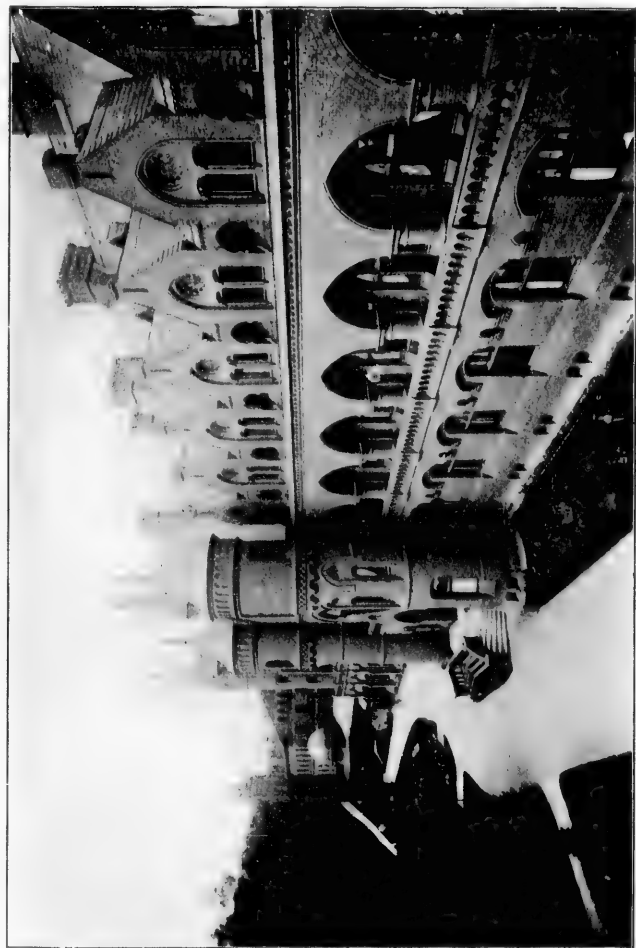


FIG. 19.—MAIN BUILDING OF DR. BREHMER'S SANATORIUM, GOERRESDOFF.

Goerbersdorf is situated in the southeastern part of Germany, in the province of Silesia, at an altitude of 1840 feet. The natural beauty of Goerbersdorf is certainly remarkable. I visited the place in midsummer and was charmed with its climate, its hills, and splendid woods. At one end of the village, in the midst of a beautiful park, stands the Brehmer Sanatorium, composed of a series of buildings. The main building is a large Gothic structure of brick, which, I confess, did not impress me as particularly well adapted for a sanatorium. The first impression this vast structure makes upon the visitor is that of a fortress or castle, rather than a residence intended for pulmonary invalids. The other buildings, as, for example, "Das Neue Kurhaus," the "White House," "Villa Rosa," etc., are of lighter and more pleasing construction. Between the old and the new "Kurhaus" is a separate construction surmounted by a tower. This was the late Dr. Brehmer's private residence, and is to-day occupied by Professor Kobert, the director of the establishment. The "White House," "Villa Rosa," etc., are located in the midst of the park; each of these villas contains about twelve rooms. The park and gardens are most beautifully kept, and one can find therein so-called Norwegian and Swiss challets, shady corners, sun-boxes, a lake containing fish, and an inclosure for deer. On one of the hills, about four hundred feet higher, is a little Russian pavilion, called the "Katharium," from which one has a most beautiful view over the Giant Mountains.

The music-rooms, parlors, reception-rooms, and bedrooms are elegantly furnished. There is a large library, numerous douche-rooms and bath-rooms. Of late there are also galleries for the rest cure. Besides, there is a beautiful winter-garden, of which I give a photograph, where the patients remain when the weather does not permit them to be out-of-doors. Ventilation, heating, and illumination are in accordance with the times. The disinfection of all the apartments is regularly done with formaldehyde, and with the special apparatus designed by Professor Kobert. A large, well-kept farm, belonging to the sanatorium, is located at some distance from the institution. There the kefir used in the sanatorium is manufactured.

Besides the establishment for patients paying the full price, there has existed since 1895 an annex to the Brehmer Sanatorium where patients with moderate means are received.

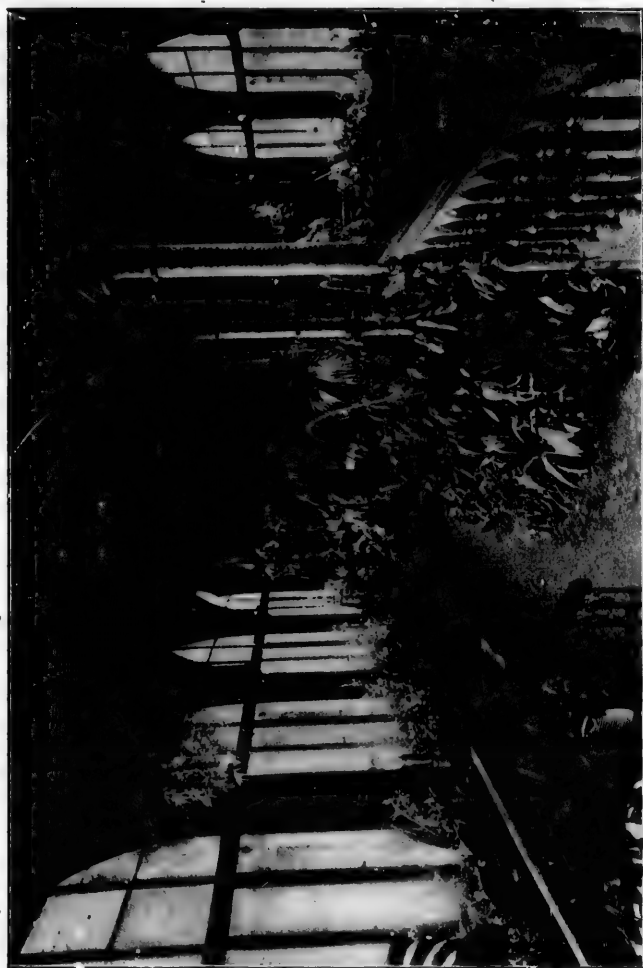


FIG. 23.—WINTER-GARDEN OF DR. BREHMER'S SANATORIUM.

The institution is under the directorship of Professor Rudolph Kobert, who is aided by five assistant physicians.

Before closing the description of Brehmer's Sanatorium, I desire to record some of the suggestive maxims which the ingenious founder of the institution has had painted on the walls of the apartments, grottos, etc. "Die lohnendste Arbeit für einen Kranken ist gesund zu werden." (The best occupation for a patient is to labor to get well.) "Wolle nur Eins und das wolle vom Herzen." (Desire but one thing and desire this with all your heart.) Under the medallion of Brehmer's fine head, cut out of stone, is to be read: "Only the physician who has studied nature and has trained his mind in mathematical science knows how to cure men." Brehmer himself was a distinguished mathematician.

At the last meeting of the Balneological Society in Vienna, it was decided to erect in Goerbersdorf a monument to the memory of Hermann Brehmer, the founder of modern phthisio-therapy.

DR. ROEMPLER'S SANATORIUM.

On a somewhat higher level than the Brehmer Sanatorium, and in a most picturesque spot in the Giant Mountains, is situated Dr. Roempler's private sanatorium. Besides the main building, more lightly constructed than the Brehmer Sanatorium, there are several pavilions distributed throughout the park surrounding the sanatorium. Along the main building, facing southeast, there is a large, comfortable gallery, of which I reproduce a picture. Here the patients take their rest cure. The "Kurhaus" proper is built in Swiss chalet style. Adjoining this is the winter-garden, which leads to the dining-room, and which is separate from the other buildings. There are several parlors, reception-rooms, billiard- and music-rooms, and a very well equipped library. The whole institution is heated by hot water. The hydrotherapeutic establishment is located in one of the villas which is centrally situated. The sanatorium has its own water-supply, derived from one of the mountains near by.

The institution is under the direct management of Dr. and Mrs. Roempler, assisted by a general physician and a specialist for diseases of the throat. The sanatorium can accommodate about one hundred patients. The most modern sanitary arrangements exist throughout the establishment, and the treatment pursued is

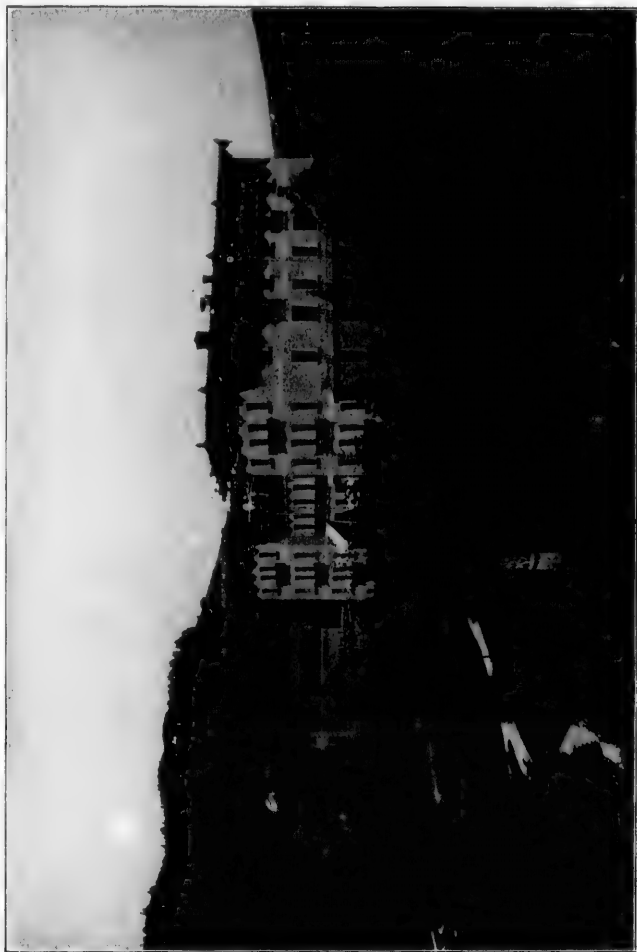


FIG. 21.—SANATORIUM OF DR. ROEMPLER.

that generally known as the Brehmer-Dettweiler system. The Roempler Sanatorium has existed since 1875, and is in a very flourishing condition.

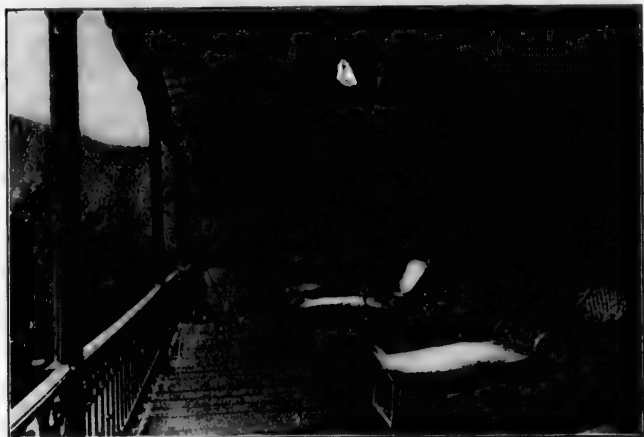


FIG. 22.—LIEGEHALLE OF DR. ROEMPLER'S SANATORIUM.

The nearest railway-station to Goerbersdorf is Friedland, on the Breslau-Freiburg Railroad ; but it can also be reached from Dettersbach, a station of the Riesengebirge Railroad.

SANATORIUM OF COUNTESS PUECKLER AND THE "KRANKEN-HEIM" OF DR. WEICKER.

The sanatorium of Countess Pueckler and that of Dr. Weicker are situated in Goerbersdorf, and are both under the direction of Dr. Hans Weicker. The former was founded through the generosity of Countess Pueckler. It has for its object the treatment and care of tuberculous invalids coming from the middle classes. It is much smaller than any of the others, and can accommodate but thirty patients. This is in accordance with the wish of the founder as well as of the directing physician, who desire this sanatorium to resemble in a measure a family home. Dr. Weicker dines with the patients of this institution at the same table. He has inaugurated so-called "zwanglose Vereinigungen,"—that is to

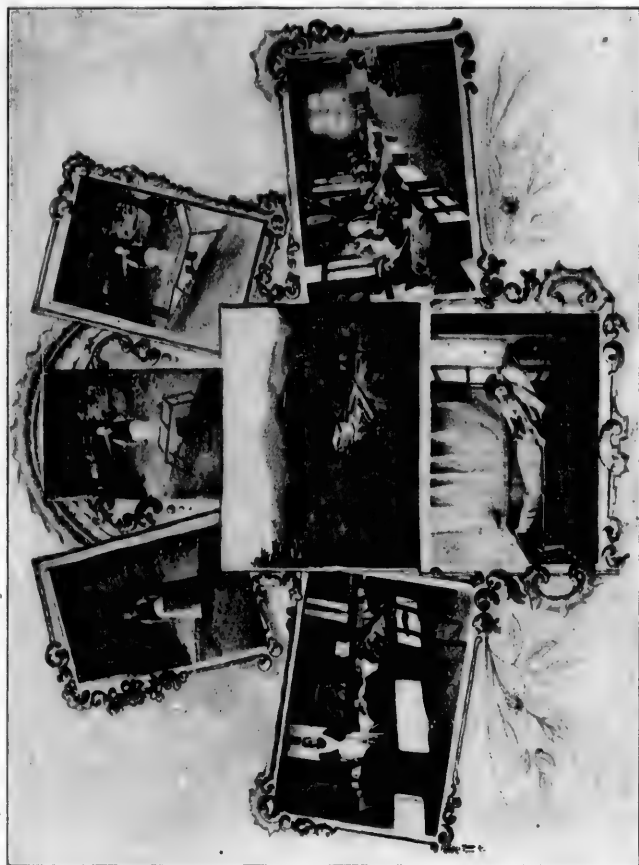


FIG. 23.—GENERAL VIEW.—LIEGEHALLE, AND DR. WEICKER'S CAMP-BED AT THE PUCKLER SANATORIUM.

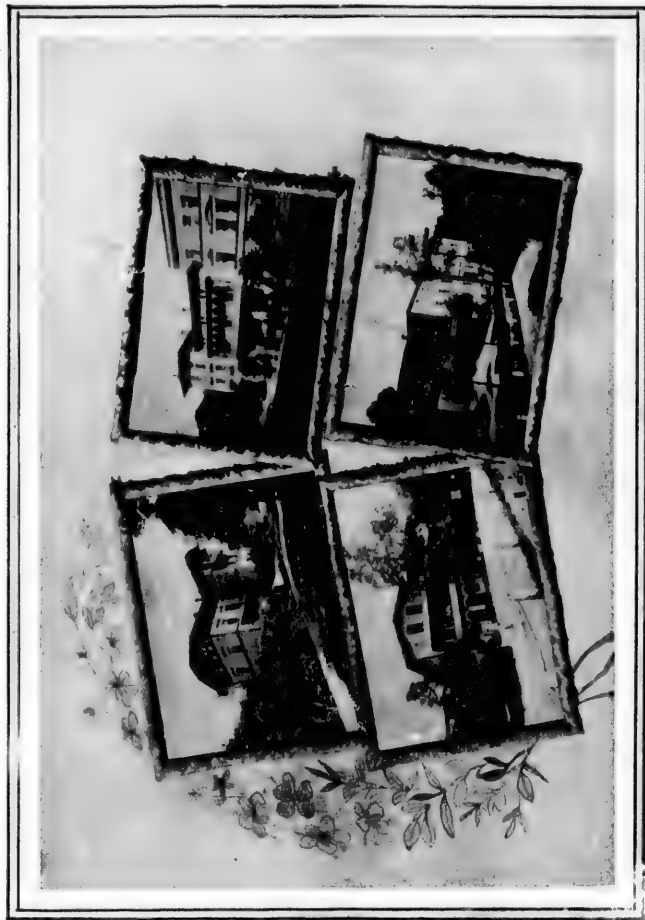


FIG. 24.—VILLAS OF DR. WÜCKER'S KRANKENHEIM.

say, informal reunions,—where patients and physicians meet, and where hygienic instructions are imparted to the patients.

The other institution under the direction of Dr. Weicker is the so-called "Krankenheim," consisting of various villas distributed throughout the village of Goerbersdorf. The Krankenheim is a sanatorium exclusively for the poorer classes, and only patients in the first degree of pulmonary tuberculosis are admitted. The majority of these patients are sent here from the State invalidity insurance companies of Germany, of which we will speak more fully when treating the social problem of tuberculosis (chap. xxv). How much this method of treating the tuberculous poor in the earlier stages is growing in favor in Germany may be shown by the statistics of the past few years, as sent to me very kindly by Dr. Weicker:

In 1894 there were	12	patients sent from these companies to Dr. Weicker.
" 1895 "	66	" " " " " "
" 1896 "	256	" " " " " "
" 1897 "	512	" " " " " "

There is a division for men and a division for women. Dr. Weicker is aided in his work by two assistants. Very interesting is the way in which Dr. Weicker maintains discipline among his patients. The inmates of each villa select from their midst a foreman, who is responsible for the order in the house and whose duty it is also to take the temperature of each patient twice daily, and to see that all the directions of the physicians are faithfully carried out.

SANATORIUM OF HOHENHONNEF.

Honnef is a little village situated on the Rhine, twenty-five miles south of Cologne. It is protected against the cold winds of the north and east by the Seven Mountains (Siebengebirge). Toward the northeast of the village is the site of the sanatorium, from which one has a beautiful view over the valley of the Rhine. The institution was opened in 1892 under the direction of Dr. Ernst Meissen, one of the former assistants of Dr. Dettweiler at Falkenstein. Hohenhonnef has an elevation of 735 feet above the sea-level, and is surrounded by a park. There are numerous promenades of various inclination, which adapt themselves particularly well to the graduated promenade exercises for the patients. The

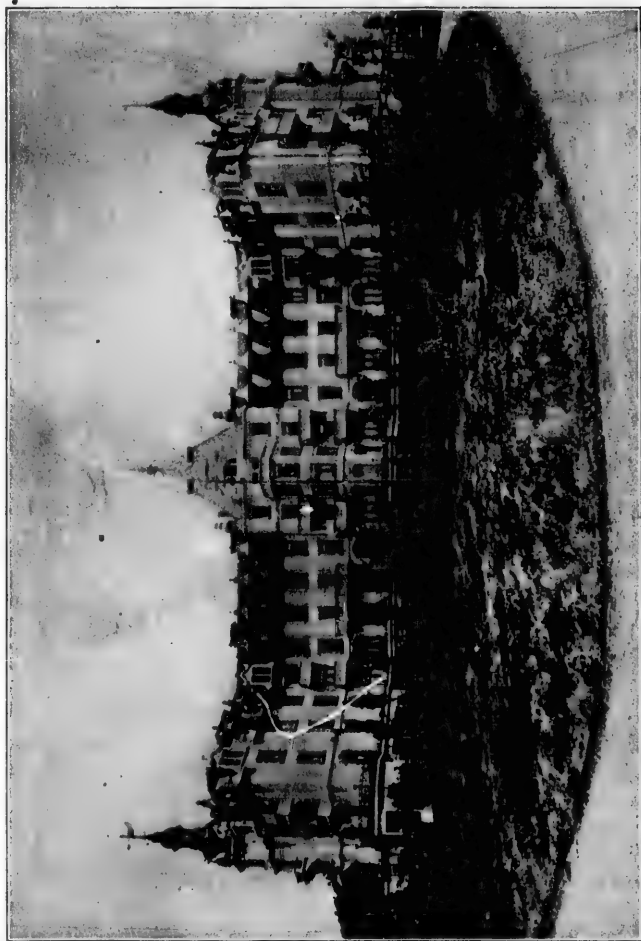


FIG. 25.—HOHENHONNEF SANATORIUM.

FIG. 25.—HOHENHONNEF SANATORIUM.

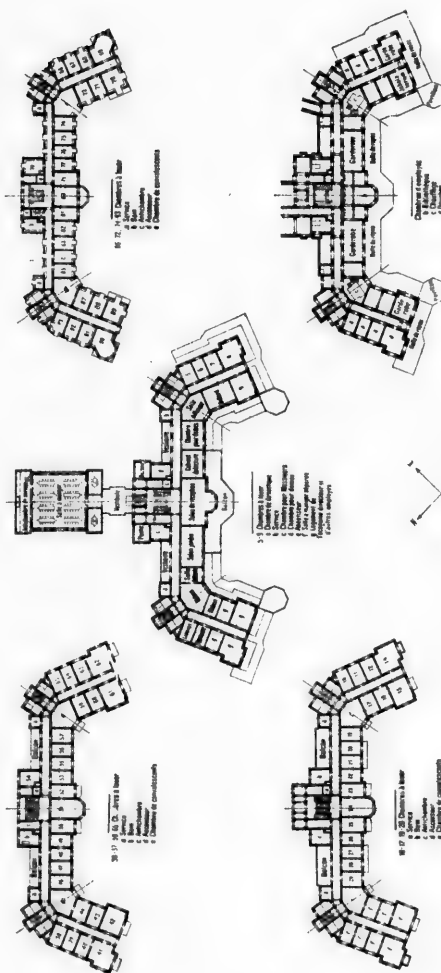


FIG. 26.—PLAN OF HOHENHONNEF SANATORIUM.

Ground floor.

Second story.
Fourth story.

Basement.
Third story.

front of the sanatorium faces southwest. There is a central building with two wings forming obtuse angles. The adjoining plan will give a good idea of the disposition of the buildings. The main building is so constructed that nearly all the rooms receive sunlight at least for a few hours during the day, the majority having a southwestern exposure. The bedrooms are large, twelve feet high, and are comfortably furnished. There are double windows and double doors. The whole establishment is heated by hot water, but, besides this, each room has its own open fireplace, its own ventilating shaft, and its own hot-water pipe, so that temperature can safely be regulated according to requirements. The movable upper windows allow an easy access of fresh air. The sanatorium has a very large, comfortable elevator, and the whole institution is lighted by electricity.

The gallery for the rest cure extends along the main front, and has room for one hundred rattan lounges (*Liegesessel*). In the basement are the douche-rooms, inhalation-rooms, etc. In the western portion of the first floor, facing north, are the rooms for the employees, the laboratories, drug-room, and a barber-shop. Facing south are the reception-rooms, parlors, library, billiard- and music-rooms. The eastern portion of the lower floor contains nine bedrooms. The upper stories contain seventy-five bedrooms for patients and also the private apartments of the medical director. For the present the sanatorium can accommodate about one hundred patients. Additional buildings are in course of construction. All the rooms, and everything connected with the institution, are most hygienically arranged. The floors of the bedrooms are covered with linoleum. All the stables, the laundry, and disinfecting-rooms, the machineries, dynamos, pumps, etc., are situated nearly five hundred feet below, in the valley, in the so-called "Asbachthal." A cable road connects the Asbachthal with the institution. The sanatorium can be reached in twenty minutes from Honnef, which is a railroad-station; also from Königswinter, which lies at a distance of forty minutes. Königswinter is also a station for steamboats plying on the Rhine.

SANATORIUM OF REIBOLDSGRÜN.

Reiboldsgrün is situated in the southern portion of the kingdom of Saxony, in the Erzgebirge, at an altitude of 2460 feet. The sanatorium was founded in 1873 by Dr. Driver, and is now under the able direction of Dr. Felix Wolff-Immermann, who is aided by two assistants.

Reiboldsgrün is most beautifully and picturesquely situated. It is surrounded by a dense pine-forest. There are no habitations



FIG. 27.—SANATORIUM AT REIBOLDSGRÜN.

near by, and the nearest village is at an hour's distance. Thus, the sanatorium is unique in its kind in Germany; the various buildings, eight in number, form a little village by themselves.

The "Kurhaus," which represents the main building, contains a large dining-room, parlors, music-room, and kitchen. In connection with the main building is the villa "Winterheim," a three-story structure with twenty-four rooms for the patients. In the lower story are the consultation-room, reception-room, and drug-room. From the Winterheim covered glass galleries lead to the rest-cure verandas and to the other buildings, such as villa "Wiesenhaus," villa "Hugosruhe," etc. There are four more

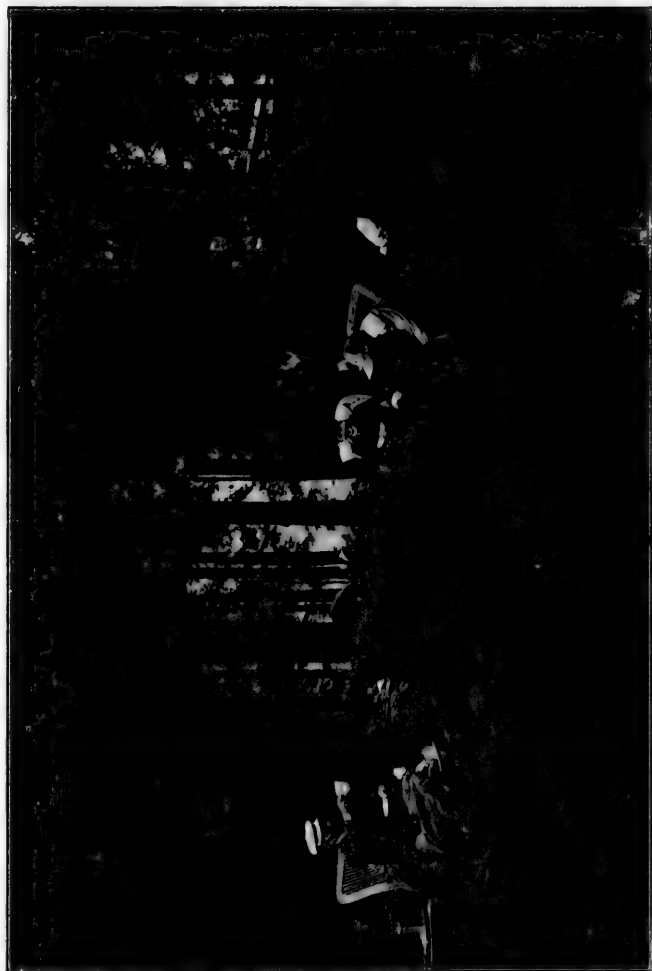


FIG. 28.—REST CURR IN THE WOODS AT RIEVALDSGRÜN.

villas of smaller sizes; villa "Thurmhaus," with twenty rooms; villa "Karlsruhe," with twelve; villa "Mathildenuhe," which is the residence of the former director, Dr. Driver, and, lastly, the private cottage of Dr. Wolff.

At some distance from these buildings are the laundry, the disinfecting-room, and the stables. The park in which the sanatorium is situated extends over five hundred acres. There is now room for about one hundred patients, but since my last visit to Reiboldsgrün Dr. Wolff wrote me that plans were in readiness to erect other and more expensive buildings.

The country surrounding Reiboldsgrün offers many interesting places for excursions. The social life in Reiboldsgrün is particularly pleasant; Dr. Wolff, himself an accomplished musician, frequently organizes concerts, theatricals, etc. There are several pianos and an organ in the institution.

As an annex to the sanatorium we must mention Zoebisch, a little colony of friends of patients residing in the sanatorium grounds, with a sprinkling of convalescent patients among them, who, while still under the doctor's care, have graduated from the sanatorium, and do not any longer require the strict supervision.

Near the sanatorium there is a natural spring containing iron salts. The water is utilized for the especially anæmic invalids of the sanatorium. The spring enjoyed a reputation even before the erection of the sanatorium. Reiboldsgrün is eight miles from Rautenkranz, a station of the Chemnitz-Adorfer Railway, and twelve miles from Auerbach, a station of the Zwickau-Oelsnitzer Railway.

ALBERTSBERG SANATORIUM.

A few hours distant from Reiboldsgrün, at Albertsberg, near Auerbach, is located the new sanatorium for the consumptive poor of the kingdom of Saxony. Its erection is largely due to the generosity of the King of Saxony, who endowed the institution, and who seems to take particular interest in the social problem of pulmonary tuberculosis. The institution was inaugurated in October, 1897, and can accommodate eighty patients. It resembles, in its exterior and interior arrangements, the sanatoria devoted to the treatment of the richer classes, and, while there is less elegance, the patients are most comfortably situated. The direction of the institution is in the hands of Dr. Gebser, a former assistant at Reiboldsgrün.

DR. HAUFFE'S SANATORIUM AT ST. BLASIEN.

Dr. Hauffe's sanatorium, which I visited in July, 1895, when it was still under his direction, has now passed into the hands of Dr. Sanders. St. Blasien is situated at the foot of the Feldberg, one of the mountains of the Black Forest. The valley is called the Valley of the Alb, and has an altitude of 2500 feet above sea-level. The Black Forest is known for its natural beauty, and St. Blasien especially for its mild climate. The air is particularly rich in ozone, and the surrounding pine-forests produce an atmosphere laden with the pleasant, health-giving odor of these trees.

The buildings of the sanatorium are situated on a somewhat higher level than St. Blasien, which is itself a health resort much frequented by neuropaths. This proximity to a very noisy and gay health resort, where dancing and sports of all kinds are much in vogue, might be considered an objection for a sanatorium for consumptives. Aside from this, Dr. Hauffe's institution offers all the advantages of the other closed establishments for the cure of consumptives. The sanatorium is composed of a series of buildings united by a glass gallery and a veranda for the "Liegekur." In addition to this, every story has balconies which serve as places for the feebler patients to take their open-air treatment. The equipment of the bedrooms, parlors, library, etc., is in accordance with the special hygiene to be observed where tuberculous patients congregate. There are no draperies, no carpets (except a few rugs), and the floors of corridors and rooms are covered with linoleum. There are special arrangements for ventilation by a sort of transom over the windows; all the other hygienic arrangements concerning the sputum, etc., are those in vogue in most of the sanatoria in Germany. The institution is lighted by electricity, and the water-supply is excellent. There are kiosks and benches distributed in a garden and park near by.

Under the management of Dr. Hauffe the sanatorium accepted even the most advanced cases; but Dr. Sanders wrote me recently that he had departed from this policy, and only accepts patients in the earlier stages of the disease who have a reasonable chance of recovery. He wishes to make the institution a sanatorium—that is to say, a healing institution in the highest sense of the word.

The village of St. Blasien is of ancient origin. Its church and cloisters, which date from the eleventh century, are still in good

preservation. St. Blasien has no railway-station. The nearest one, at Albrück, on the Basel-Constance Railway, is at a distance of about twelve miles. Another station is Titisee, at a distance of fourteen miles from St. Blasien, on the Freiburg-Neustadt line.

DR. OTTO WALTHER'S SANATORIUM.

Dr. Walther's institution, which is situated in Nordrach, in the Black Forest, is also known by the name of the "Nordrach Colony." It is at an elevation of 1500 feet and commands a beautiful view of the valley, opening toward the south and southwest. It consists of a series of small buildings situated at considerable distance from each other. There is a central building which contains the dining-room and administration-rooms. There are no galleries for the rest cure as in other institutions, but some of the rooms have balconies. In the equipment of the rooms much attention has been paid to hygienic arrangement, even to the furniture. Linoleum on the floor, plain walls, iron bedsteads, etc. The "Liegessel" remain in the rooms, which are constantly well aired. Dr. Walther trains his patients so that they can even stand drafts. He ascribes the majority of colds rather to the enfeebling of an organism by too much exercise than to the sudden changes of temperature.

The Nordrach Colony is surrounded by a beautiful forest, which, however, is at a sufficient distance to allow plenty of sunlight for the whole colony. There is a douche- and bath-room with each bedroom. All the buildings are heated by steam, which comes from the central building. The sanatorium has also its own electrical plant, dairy, steam laundry, and also an ice manufactory.

The institution is very flourishing and is much visited by American and English patients. A lady teacher is attached to the institution to teach the children, who are either patients or have come with their parents. Dr. Walther's sanatorium can accommodate about forty patients. The nearest railway-station to Nordrach is Gengenbach, on the Black Forest Railroad.

ODERBERG SANATORIUM.

In describing the "Krankenheim" at Goerbersdorf, I mentioned the work done by the State invalidity insurance companies of Germany in relation to sanatoria for the treatment of tuberculous patients. The first insurance company which undertook the creation of its own sanatorium for its tuberculous clients was the "Hanseatische Versicherungsanstalt für Invaliditäts- und Altersversicherung" of Lübeck. The company selected a beautiful site in the Harz Mountains near St. Andreasberg, and built the institution on the slope of the Great Oderberg, at an altitude of nearly two thousand feet. The surrounding mountains and woods protect the sanatorium from cold winds. The institution, of which I give an illustration, is most interestingly situated and managed. There is a main building consisting of a central portion and two annexes. To the west and communicating with the annex is the machinery-room and laundry. To the south, separated from the main building, is the residence of the physician-in-chief. At a distance of about fifty feet to the west of the machine-room are the disinfecting- and autopsy-rooms. About three hundred feet to the northwest of the main building is a building which is occupied by the employees and their families, and nearly five hundred feet to the west are located the stables. The buildings occupy an area of about eight or nine acres.

The principal building, facing south, is a four-story structure. In the basement are the kitchen and the store-rooms. The first story contains consultation-, administration-, and dining-rooms. In the annexes on the first story are the bedrooms for the patients. The second story of the central building is occupied by the general superintendent and the assistant physicians. The east side-wing contains a large parlor and promenade corridor. The rest of the building consists of bedrooms for patients. There are, in all, seven rooms with one bed each, fourteen rooms with two beds each, six with three beds each, and fourteen with four beds each. Besides these there are four bedrooms reserved for the purpose of isolating patients. Thus, about one hundred and ten patients can be accommodated. The interior equipment of the institution is plain, comfortable, and hygienic. The ventilation in all the rooms is perfect; the heating is done by steam, and the establishment is lighted by

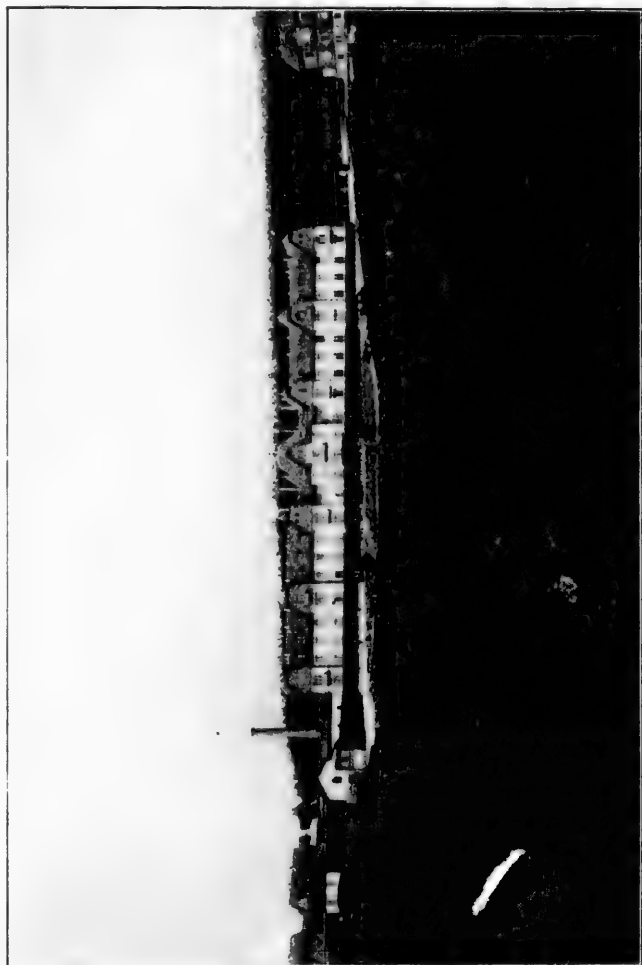


FIG. 29.—ODURBERG SANATORIUM.

electricity. It has also an excellent water-supply and a good drainage system.

In imitation of Goerbersdorf, the walls are ornamented with suggestive verses. So, for example, we read, in the dining-room, "Allen Menschen Recht gethan, ist eine Kunst die Niemand kann" (To please and suit each single one, is science understood by none). At another place we find the following: "Streng gegen Dich, gerecht gegen Alle" (Be severe with yourself and just toward others). "Zwei Dinge lern geduldig tragen: Dein eignes Leid, der Andren Klagen" (Two things try to bear with resignation: your own misfortune and others' lamentation). There are other maxims inscribed on the walls referring to intemperance, cleanliness, the value of fresh air, etc., which space forbids us to reproduce here.

In front of the building is a large, covered gallery, and along the east and west sides of the house are the galleries for the rest cure and promenade exercises on rainy days. These galleries have a length of 410 feet and are nearly twelve feet wide. There is a large square in front of the sanatorium, which, being especially protected against cold winds, is a favorable place for patients to take their promenades.

The discipline in this institution is maintained in a somewhat similar way to that in vogue in the *Krankenheim* of Dr. Weicker. A certain number of patients select a foreman, who is responsible to the physicians and the general superintendent (two distinct offices) for the carrying out of the general and medical directions on the part of the patients. The treatment in the institution is the hygienic and dietetic treatment as in all sanatoria, and the patients are sent to the institution in the very earliest stages of the disease—that is to say, as soon as the medical examiner of the insurance company is able to detect it.

SANATORIUM OF CANIGOU.

This is the first institution which was founded in France where the hygienic and dietetic treatment, according to the principles laid down by Brehmer and Dettweiler, were carried out. This is done with as much rigor as the peculiar arrangement of the Canigou institution will permit.

I visited Canigou in the spring of 1895, when the institution was

still under the direction of Dr. Sabourin, who has now a sanatorium at Durtol, in the department of Puy-de-Dôme, known by the name of "Sanatorium du Château de Durtol."

The present director of the sanatorium of Canigou is Dr. Giresse. The peculiarity of this institution is that the gallery for the rest cure is situated several hundred feet higher than the main building, which, in reality, is a hotel. The patients take their early breakfast here, and then proceed to the gallery. The next meal, which is served at noon, though called *déjeuner*, has an elaborate menu and is served in the dining-room annexed to the veranda for

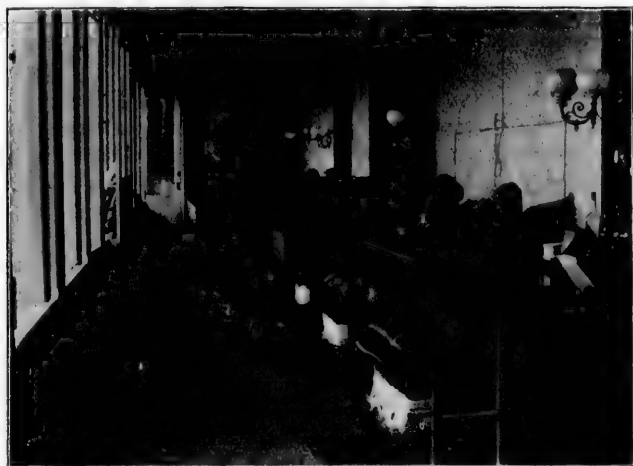


FIG. 30.—REST CURE GALLERY OF THE CANIGOU SANATORIUM.

the rest cure. Toward evening the patients descend to take their dinner at the hotel where they reside. Many of them are strong enough to make their ascent and descent on foot, while the feebler ones are conveyed in a closed omnibus. Aside from this the patients are treated as in the German sanatoria, and while the meals are arranged according to the French fashion,—"*premier déjeuner*" at 8 o'clock in the morning, "*déjeuner*" at 1 o'clock, and dinner at 6 P.M.,—the *suralimentation* is, nevertheless, adhered to. At about 4 o'clock the patients take a lunch consisting of raw chopped meat with bread and butter, and throughout the day they

drink a good deal of milk between meals. Sabourin instituted the use of hot-water cans to be put at the feet of the patients on very cold days, when taking their rest cure. The physician spends a good deal of his time with the patients up in the mountain annex, but he does not live in the hotel. The institution can hardly be called a closed establishment in the sense of the German interpretation of the term "geschlossene Heilanstalt." But I was assured by some of the patients that they rather liked the change of going up and down, this being a pleasant interruption to the rather monotonous mode of life in the sanatorium. They like to commence their "jour médical" with a slow ascension to the terrace, where they have plenty of time to rest on their rattan lounges. They look forward to their return to the hotel as another pleasant change. The number of patients at the time of my visit was about seventy.

During the hottest months in summer the institution is closed; but aside from the few very hot months the climate of Vernet-les-Bains, the village near which Canigou is situated, is well adapted to the treatment of tuberculosis. The gallery of the sanatorium is at an elevation of 2250 feet above the sea-level, and has a south-western exposure. The average temperature is 42° F. for the winter, 58° for the spring, 68° for the summer, and 46° for the fall. There are about six days of snow and seventy days of rain during the year. The sanatorium is named after the Canigou Mountain, which is 9135 feet high. Vernet-les-Bains is a village in the Pyrénées Orientales. It has been known for centuries for its thermal waters, and is beautifully situated on the northwest end of a shoulder of Mt. Canigou, on the banks of a stream called the Casteill. Vernet-les-Bains can be reached within fifty minutes from Prades, which is the terminus of a little railway starting from Perpignan. The latter is one of the most important stations on the Narbonne-Barcelone Railroad.

MARITIME HOSPITAL OF BERCK-SUR-MER.

One of the most important institutions existing in France, and perhaps in the world, devoted to the treatment of the tuberculous diseases of childhood, is the Maritime Hospital of Berck-sur-Mer.

While a student in Paris I was fortunate enough to spend a university vacation in this interesting sea-side town, where no less than



FIG. 31.—MARITIME HOSPITAL AT BERCK-SUR-MER.

four large institutions, exclusively devoted to the treatment of scrofulous and tuberculous children, are situated. The largest and most interesting one is the above-mentioned, which belongs to the city of Paris. It is under the able direction of Dr. D. Ménard, to whom I am greatly indebted for the many privileges and favors granted to me during my stay at Berck. It was at this large hospital, which can accommodate from 500 to 600 patients, that I had an opportunity to observe the beneficial effect of the sea-coast air on tuberculous diseases of childhood, which were principally tuberculosis of the joints, bones, and the glandular manifestations. One could see almost a daily improvement in these little sufferers sent from the great, crowded city hospitals of Paris. It was really astonishing how rapid was the recovery of most of the children who had undergone quite serious capital operations, resections, amputations, etc.

The institution faces the ocean. The first small building was erected in 1861 by the "Administration de l'Assistance Publique." Besides this institution, entirely supported by the city of Paris, and intended for the absolutely poor, there exists an additional hospital called "l'Hôpital des Enfants Assistés." Here the patients pay a part of the expense. Both institutions are nearly always filled.

Dr. Ménard is assisted by various internes and externes. He has the title of Médecin et Chirurgien en Chef. The wards in the Maritime Hospital are large, well ventilated, and well kept. All the convalescent children are permitted to bathe in the ocean during the summer months.

The two other hospitals are l'Hôpital Rothschild, which is kept up by the generosity of the Rothschild family for the benefit of poor tuberculous children of the Hebrew faith, and another Roman Catholic institution maintained by the Sisters of Charity. The two last-named hospitals are under the direction of Dr. Calot, celebrated for his method of forcible extension in spinal curvatures caused by Pott's disease.

SANATORIUM OF DR. TURBAN AT DAVOSPLATZ.

Davos has long been known as a favorite climatic resort for tuberculous patients. For the first climatic observations we are indebted to Dr. Spengler, which date back to 1862. In 1863 a Dr. Unger, being consumptive, went to Davos and recovered his health.

Professor Jaccoud, of Paris, made an extensive study of the climatic condition of the Davos Valley, and recorded his observations in full in his book on the curability and treatment of pulmonary phthisis. Hermann Weber, of London, a distinguished writer and authority on climatology and pulmonary diseases, discusses at length the climate of Davos. I have myself visited Davos and can not but agree with the authors, who consider this region as especially favorable to the treatment of pulmonary tuberculosis in its earlier stages. The most interesting and important fact which strikes the meteorological observer is the great amount of sunshine which Davos enjoys. While at Zürich the amount of sunshine during the month of November was forty-eight and one-half hours, or an average per day of one hour and thirty-six and one-half minutes, it was at Davos one hundred and twenty-eight hours, or four hours and sixteen minutes per day.¹ There is but little mist in Davos, and even very low temperatures are well borne by tuberculous patients in the dry, calm atmosphere of this Alpine winter resort. It is doubtlessly due to the intense insolation that one feels the cold so much less than at ordinary altitudes. Such a climate, where the patients can remain out-doors so many days in the year and so many hours of each day, must of necessity be well adapted to the hygienic and dietetic treatment of tuberculous patients.

In 1883 the first sanatorium for the exclusive treatment of consumptives was erected at Davosplatz by Hofrath Dr. Turban. To the honor of Dr. Turban may it be said that the sanatorium is in the highest sense a closed establishment, for in none of the many sanatoria I have visited in Europe and in the United States have I seen a more rigid discipline prevail than in Dr. Turban's sanatorium. It is situated to the southwest of Davosplatz, and at an altitude of 5115 feet; well protected from the winds, it is also at a sufficient distance from other habitations. The building was erected by Erdmann Hartig, of Brunswick, a distinguished architect. Looking toward the south one has from the sanatorium a vast and beautiful view of the Davos Valley and the high, encircling mountains. The building itself is surrounded by a well-kept garden with graduated promenades, benches, and kiosks. The principal building faces south. It is four stories high and communicates with two

¹ Weber, "Croonian Lectures."

villas by closed galleries; the one situated toward the west is occupied by Dr. Turban and his family; the one toward the east by patients. In front of the main building are the galleries, 250 feet long, where the patients take their rest cure. In the basement are the offices, the laundry, and the kitchen. The first story contains a large dining-room forty-eight feet long, thirty feet wide, and sixteen feet high; also conversation-rooms, library, billiard-room, consultation-room, laboratory, and drug-room, besides a hydrotherapeutic and gymnastic institution. In the upper story



FIG. 32.—DR. TURBAN'S SANATORIUM, DAVOSPLATZ.

of the main building all the bedrooms face south, while on the north there is nothing but a large corridor. Nearly all the rooms have balconies. The equipment of the rooms is, of course, also thoroughly hygienic. There is a special heating and ventilating apparatus, whereby the temperature of the cold air coming from the outside is regulated. The whole establishment is lighted by electricity. At a distance from the main building is to be found a good disinfecting apparatus. The sanatorium can accommodate seventy patients.

A unique institution at Dr. Turban's sanatorium is his class of "Prophylaktiker." This comprises the children of his tuberculous patients, whom he educates physically and intellectually, so that they will not become consumptive like their parents. For the last few years Dr. Turban has not admitted any advanced cases into his institution. Besides Dr. Turban there is an assistant physician in constant attendance. Davosplatz is the terminus of the Right Landquart-Davos Railroad.

SANATORIUM AROSA.

To the west of Davos is the valley of Arosa, which has come quite in favor of late as a winter resort. The difficulty of communication has, until some years ago, been a hindrance to the development of this locality. But lately there has been constructed a beautiful route between Arosa and Chur, the nearest railway-station. Arosa can be reached from Chur by stage or carriage within five or six hours. The valley of Arosa is surrounded on all sides by an uninterrupted mountain chain composed of snow-capped peaks varying from 7000 to 10,000 feet in height. The valley itself has an altitude of about six thousand feet. The slopes of these mountains are covered with dense forests of pine-trees. At a height of about seven thousand feet there are two beautiful lakes with clear water, which give a picturesque aspect to the landscape. Toward the southern slope of the Tschuggen Mountain, at an altitude of 6150 feet, is situated the sanatorium, which was constructed during the years 1887 and 1888. Thus protected from the north by the mountain, it is free toward the south and west, so that a beautiful panorama unfolds itself before one's eyes. There is a great deal of sunshine on the whole slope where the sanatorium is situated, but, of course, the inevitable Föhn—the hot, south wind of the Alpine regions—is as frequent here as anywhere in these high regions. Happily, the forests regulate and moderate the temperature of the atmosphere, so that the average and minimum temperatures of Arosa in winter are four degrees higher than at Davos, which has an altitude of nearly one thousand feet less. In summer, on the contrary, Arosa is somewhat less warm than Davos. The atmosphere, as a rule, is calm in winter, and there is relatively little rain.

The new sanatorium is a large, majestic building, the majority of

the rooms facing south and southwest. A few rooms have balconies, but each room has its own fireplace, while the corridors are heated by hot water. There are dining-rooms, reception-rooms, parlors, and a billiard-room. There is a covered veranda facing south, where the chairs for the rest cure are placed. Here the patients pass the greater part of the day. There is a separate hydrotherapeutic establishment and also a separate building for disinfecting purposes. The water-supply and drainage system are good. The sanatorium is now under the management of Dr. E. Jacobi. It is open throughout the year, and can accommodate sixty-five patients.

SANATORIUM OF LEYSIN.

Leysin is a little village in the Canton de Vaud, in Switzerland, situated in a mountain valley at the foot of high peaks, called the Tours d'Ai. The exceptionally pure atmosphere of this part of Switzerland has been known to the Swiss for years, and many rich people have erected villas near Leysin, where they spend part of the year. The sanatorium of Leysin, however, was constructed so late as the year 1891, and opened a year later. It has an altitude of 4750 feet, and is situated about nine hundred feet above the village. It is well protected from the cold winds, and is surrounded by a pine-forest. The insolation is intense, and, as in Davos, the cold is not felt by the patients to the same degree as in sanatoria of lower altitudes. The air is calm, and the rare winds come mostly from the south. From the terrace, "Liegehalle," and rooms of the sanatorium one has a most beautiful panorama of mountains, forests, and villages. To the right is the valley of the Rhone, which one can follow from St. Maurice to Aigle. The building is constructed on a large plateau (Plateau de Feydey), and in accordance with the rules of hygiene and comfort. The five stories contain 110 rooms, of which ninety face the south, the others the west. The majority of these rooms have balconies. All the rooms are nearly ten feet high. The douche-rooms and the gymnasium are in the basement. In the first story are the dining-room, reception-rooms, winter-garden, etc. The equipment of the whole institution—furniture, curtains, carpets, etc.—have all been selected with a view of easy and thorough disinfection. Ventilation and heating is effected by a steam apparatus under high pressure; many of the rooms, however, have open fireplaces in addition.

To the east of the main building, facing south, is a gallery nearly one hundred feet long, where the patients take their rest cure. Around the institution are distributed numerous sun-boxes where patients may rest from their excursions and promenades. There is an excellent water-supply, which comes from the Tours d'Ai, and which is conveyed to the institution in metallic tubes.

Leysin is better adapted to the farther advanced cases than Davos. The institution was especially erected to give the French-speaking population a sanatorium of their own, the sanatoria of Canigou, Durtol, and Pau being of more recent creation.

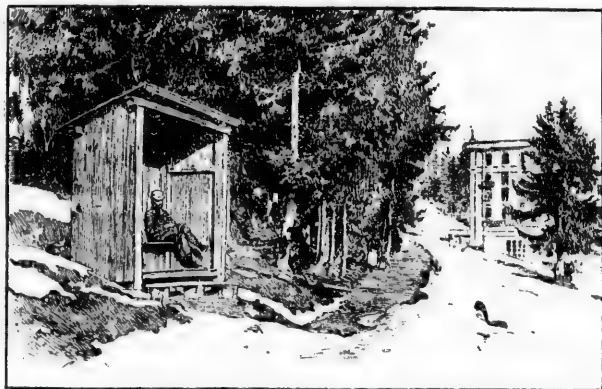


FIG. 33.—A KIOSK AT THE LEYSIN SANATORIUM.

When I visited Leysin I could find but one arrangement which, in the eyes of a rigid, modern phthisio-therapist, would be considered objectionable. They were building a casino, which, in the European interpretation of the word, means a place of very lively amusement, scarcely conducive to the well-being of a pulmonary invalid. Aside from this the treatment and management at Leysin, now in the hands of Dr. Exchaquet, is the same as in the German sanatoria, with but very little variation. The institution can accommodate 130 patients. The nearest railway-station to Leysin is Aigle, on the Jura-Simplon line.

TONSAASEN SANATORIUM.

The first sanatorium established in Norway for the exclusive treatment of pulmonary tuberculosis was founded in Tonsaasen by Dr. Andvord, in 1887, under the name of the Sanatorium of Tonsaasen.

Although Tonsaasen has been known as a health resort since 1882, it was only in 1885 that some patients, under the direction of Dr. Andvord,¹ remained all winter. To-day the sanatorium

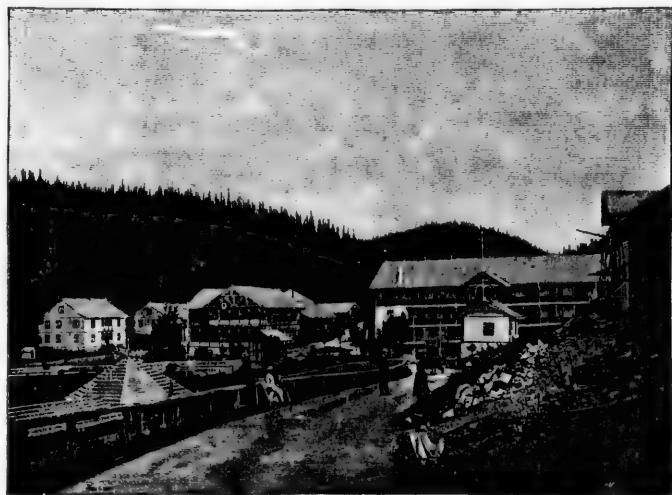


FIG. 34.—SANATORIUM OF TONSAASEN.

enjoys a well-merited reputation as an excellent institution for the treatment of consumption. The establishment is open all the year, and the results obtained are as good as in the other sanatoria of Europe. This beautiful, mountainous, and wooded region of Norway seems to be well adapted to the treatment of consumptives.

The climate, which was first described by Moeller, in his book "*Les sanatoria pour le traitement de la Phtisie*,"¹ is particularly

¹ Moeller, Bruxelles, 1894.

interesting. It resembles that of the higher Alpine regions. The high mountains surrounding Tonsaasen and the vicinity of the great, dense forests produce an almost uniform climatic condition. The summer is not hot; the temperature has been known to descend even to the freezing-point. The nights are characteristically beautiful and calm in Norway. While in the winter the thermometer descends often very low, the stillness of the atmosphere makes even the coldest days bearable. Of course, the melting of the snow in spring causes some disagreeable days. There is relatively little wind, and the lowest temperature is about twelve degrees below zero, Fahrenheit. The topographical situation of the sanatorium is very picturesque. It is built on a plateau, from which an extensive view can be had on one side over the valley of Bagna, on the other side over the valley of Etna. A beautiful and picturesque route unites the two valleys. Many little streams and waterfalls enliven the landscape, and some of the high mountains are perpetually covered with snow.

The establishment is situated 1850 feet above the sea, and is composed of six different buildings. There are large verandas in front of all the houses, where the patients take their rest cure. The largest of the six buildings contains the dining-room, music- and conversation-rooms. The interior equipment is plain, comfortable, and in accordance with the conception of modern hygiene for pulmonary invalids. There is also a hydrotherapeutic institution, where patients receive their douches and where plain and medicated baths are given. The aërotherapeutics, as carried out at Tonsaasen, are particularly interesting. Dr. Andvord assured me that he has his patients take the rest cure in the open air, on their chairs, well tucked up in their furs, from seven to nine hours per day, even when the temperature is as low as 10° or 12° F. below zero.

Recently the direction of the sanatorium has passed into the hands of Dr. Soemme. Tonsaasen, which is a railway-station, can be reached from Christiania by way of Randsfjord, Spirillen, or Mjosen, or from Bergen by way of Leirdalsoren.

ALLAND SANATORIUM.

It was in 1883 that Professor Ritter von Schrötter, of the Vienna University, conceived the idea of creating an institution for the treatment of the poorer classes of consumptives. He had it especially in view to relieve the crowded hospitals of Vienna from the numerous consumptive patients which were distributed in their wards. In 1884 he formed the first committee for the purpose of carrying out his plans; but it was not until 1892 that an association was formed for the purpose of erecting and maintaining a sanatorium for tuberculous patients. An appeal to the public was made, and, with the aid of many generous philanthropists, a capital sufficiently large was placed in the hands of the building committee. A beautiful and suitable locality was found in a valley at a distance of about seven miles from Baden, near Vienna, and not far from the little village of Alland, in the Wienerwald. This region, protected from the north, the east, and the west by a mountain chain, open toward the south, is particularly well adapted for a sanatorium for consumptives. The highest part of the valley is about two thousand feet, and the sanatorium is built at an elevation of 1300 feet. The plan of the sanatorium was drawn by Professor Thyer, of Gratz. The main building has three stories. There is one large room 35 feet long, of which all the windows face south. This forms the parlor. On each side of this parlor are two wards, one with eight and the other with four beds. On the same floor are also the bath-rooms and rooms for the nurses. The upper stories are occupied by bedrooms, but besides these each story has an inhalation-room and a special room for the application of douches. The recreation-room and the kitchen are annexed to the main building. There are separate buildings for laboratories and for performing autopsies. The physician-in-chief lives in a separate pavilion, but his assistants have rooms in the sanatorium. Only patients are received who come from the hospitals of Vienna and are in the primary stages of the disease. Every patient admitted into the sanatorium is taken on a three weeks' trial. If he improves, he is retained three weeks longer; if not, he is sent back to one of the general hospitals, which means that his case is considered incurable. The patients are expected to follow implicitly the rules and regulations of the institution and the prescriptions of the physicians. The treatment, of course, is hygienic and



FIG. 35.—ALLAND SANATORIUM.

dietetic—so vastly different from that employed in the general hospitals.

There is a large tract of ground belonging to the sanatorium where the patients can enjoy outdoor life. The stronger ones are permitted to do light work, such as gardening, etc. The sanatorium thus far can accommodate 350 patients.

At the head of the enterprise and the society stands the energetic and distinguished Professor von Schrötter. The society is now in a most flourishing condition, and is called "Verein zur Errichtung und Erhaltung klimatischer Heilstätten." It has now more than one thousand members, among them many of the most aristocratic families of Austria, and His Majesty, the Emperor, as its protector. The medical director of the institution is Dr. Ritter von Weissmayr, who is aided by several assistant physicians. The success of this, the first institution of its kind in the Austrian empire, has, I am glad to say, been the cause of starting similar movements in other Austrian cities, such as Baden, Brück, etc.

ROYAL HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST AT VENTNOR.

To make the title of this institution complete, one should add "On the Separate Principle," and "Founded for the Reception of Patients of Both Sexes from all Parts of the Kingdom." As Patron we should have to mention Her Gracious Majesty the Queen; and as President, the Right Honorable the Earl of Roseberry, K.G.; and as Treasurer, Frederick Charles Colman, Esq., J.P.; and as Chairman of the Board of Managers, Sir Richard E. Webster, G.C.M.G., Q.C., M.P.

I visited Ventnor a few years ago in the fall, and could appreciate why the noble founders selected the Isle of Wight for a national institution to treat their consumptive poor. Ventnor is situated on the southeastern coast of the Isle of Wight. The climate is particularly mild and the atmosphere very pure, and, owing to the vicinity of the ocean, free from pathogenic micro-organisms. The highest temperature recorded during the summer was 80° F., and the lowest during the winter 25° F. It was in 1868 that Dr. Hill-Hassall began, with a modest building, the institution which, up to 1895, had treated no less than 12,500 patients.

To-day the hospital comprises ten blocks, providing accommo-

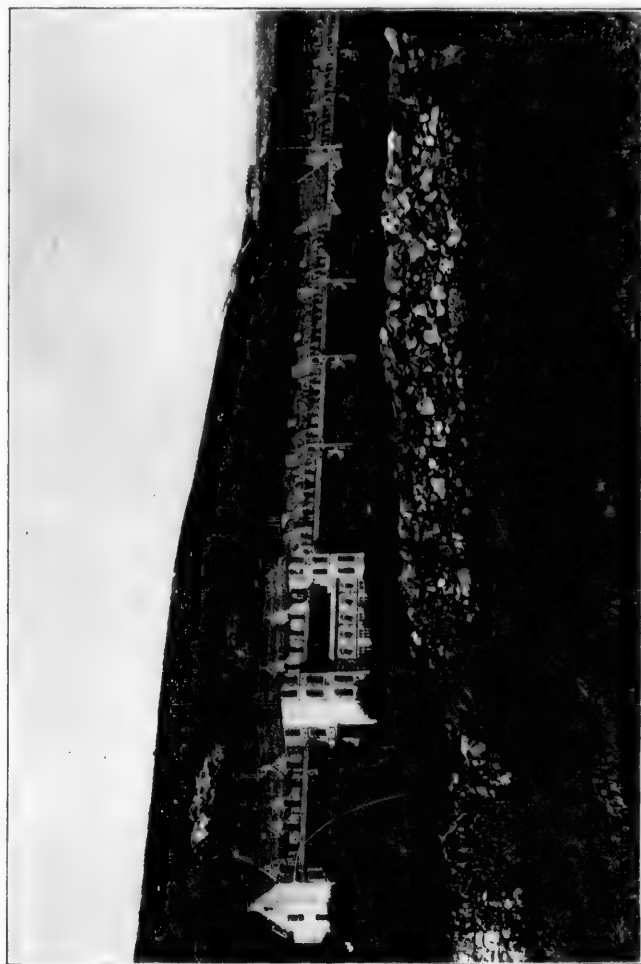


FIG. 36.—ROYAL HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST AT VENTNOR.

dation for 134 men and women patients, with a chapel in the centre (connected by a subway). The establishment is situated in one of the loveliest and most sheltered spots of the Undercliff. The site covers more than twenty acres, and is about three-quarters of a mile distant from Ventnor. The hospital is erected upon *the separate principle*—that is to say, each patient has a separate bedroom. The patients are distributed through the various houses, which are well sheltered from unfavorable winds, constructed upon sound, sanitary principles, and surrounded by gardens. The patients enjoy the advantages of large sitting-rooms, a lovely landscape and sea-view, plenty of light and sea-air, effective ventilation and good drainage, and a regular temperature—in short, the comforts of a home, with the medical appliances of a hospital.

I am sorry to say that I have to use the word "hospital," for such it is in reality, and not a sanatorium. There are no verandas, no reclining chairs where the rest cure, or "Liegekur" of the Germans, can be carried out. I am convinced that if the governors of that splendid institution at Ventnor would admit this innovation, in addition to the existing method of treatment, the results would be even better—excellent as they are. For 1896 Dr. Coghill reports a mortality of 4.7 per cent.; very much improved, 18.5 per cent.; improved, 60.5 per cent. The cases eligible for admission are those in an early stage of pulmonary tuberculosis, and which, therefore, afford a reasonable expectation of marked alleviation or cure. Each person is required to pay \$2.50 per week, in part payment of the cost of maintenance, etc., and (on entrance) a guarantee fee of \$5.00 to the general superintendent, which will be returned on leaving the hospital, unless any portion of it shall have been forfeited for damage done.

The institution has an annual expenditure of \$55,000. The greater portion is raised by voluntary subscription.

On my visit I was most cordially received by Dr. Perkins, who was then one of the physicians in charge. Among the examining physicians we note Dr. Hermann Weber, the celebrated climatologist; Dr. Port, Dr. Thorowgood, and Dr. Davies, of London. Besides these there are three visiting and three resident medical officers.

BROMPTON HOSPITAL.

Of the several hospitals for the treatment of consumption existing in the city of London, I wish to describe the most interesting, oldest, and largest institution of the kind.

Brompton Hospital was founded in 1841. It is built in the shape of the letter H, the depth of each wing being 190 feet, and the width of the building 200 feet. It stands in a square piece of ground covering three acres, and faces the street. On entering the lodge-gate there are three broad drives—one to the central entrance,



FIG. 37.—HOSPITAL FOR CONSUMPTIVES, BROMPTON (LONDON).

which opens into a cheerful hall upon the first floor; another to the east entrance, which leads to the offices for the transaction of the hospital business; and the third to the west entrance, which is for the use of the inmates and the friends of the in-patients on visiting-days. The grounds are well drained, so that the broad terrace-walks become available for the patients very soon after the heaviest rains.

The ground-floor is on a level with the gardens. The west wing contains rooms for the physicians, resident medical officer and clinical assistants, and servants' hall. The east wing contains the apartments of the lady superintendent, the linen-room, store-room,

secretary's office, board-room, and nurses' sitting-room. The heating of the hospital is effected by hot water constantly circulating in large pipes extending throughout the building. The ventilation is obtained by means of extracting-shafts, consisting of two lofty towers heated with steam, into which the vitiated air is drawn through large ducts leading from all the wards and corridors. There are also open fireplaces in all the wards, both on account of their cheering appearance and warmth, and their use as ventilating agents. The kitchen is on the north side of the central basement corridor, in a separate building; it is of large size and is fitted with all the modern contrivances. Immediately adjoining is the boiler-house, in which are the two boilers for supplying hot water to the systems of pipes for warming the building. It also contains a powerful steam-boiler, which generates steam for heating the extracting-coils in the ventilating towers. This boiler likewise supplies steam to heat the water in the kitchen and baths, as also to grind the coffee and to run the dumb-waiter, which takes up the patients' meals hot from the kitchen, as well as other necessities; also to raise an elevator for conveying to and from the galleries those patients for whom exercise in the grounds is desirable. This is a great comfort for the more feeble, as they are enabled to enjoy the garden and fresh air, which otherwise they would not be able to enter by reason of the fatigue of going up and down the stairs.

The second floor is devoted exclusively to female patients, except small rooms for the chaplain and for each of the two head nurses, and the two requisite pantries, baths, and lavatories. The temperature is the same in the galleries as in the wards; patients are, therefore, able to read or work in these well-lighted, roomy corridors without inconvenience or exposure; or they may walk there when the weather will not permit of their going out; they are also provided with easy couches and seats and movable tables for meals. The gallery of the west wing is named after Her Majesty, the Patron of the Charity and one of its earliest friends, and is called the "Victoria Gallery." The gallery of the east wing is called the "Jenny Lind Gallery," in testimony to the kindness of Madame Lind-Goldschmidt, who enabled the committee to commence the building of the wing, now filled with grateful patients. The second floor accommodates 103 female patients.

The arrangements on the third floor are precisely the same as

those on the second; the wards being occupied by male patients, for whom there are 107 beds. The west gallery is named after H. R. H. the late Prince Consort, who laid the foundation-stone of the hospital in 1844, and is called the "Albert Gallery." The east gallery is called after the late "Sir Henry Foulis, Bart.," at whose expense the beautiful chapel of the hospital was built. The breadth of the galleries in both floors is ten feet, and their height and that of the wards is fourteen feet.

The attic-floor has comfortable dormitories for the nurses and servants, and in the tower are the sleeping-apartments of the clinical assistants.

During my visit to the hospital, under the kind guidance of Dr. Philip, who was then resident medical officer, I was pleasantly surprised by the scrupulous cleanliness of everything, and the particular care which was exercised concerning the disposal of the tuberculous expectoration. As a consequence of the great care in everything that might possibly lead to a contamination, there has never been a case of contracted tuberculosis among nurses or other employees of the hospital. This led Dr. Williams, one of Brompton's most distinguished physicians, to deny the communicability of pulmonary tuberculosis. To my regret there is also in Brompton an absence of arrangements to carry out the rest cure, such as inaugurated by Dettweiler of Falkenstein.

Brompton can accommodate 321 patients.

While the work of the English hospitals for the consumptive poor cannot be too highly estimated, I can but feel that a custom of granting privileges to governors and subscribers in regard to the admission of patients must, of necessity, be a detriment to impartial charity and impartial selecting of the cases which would be most benefited by a sojourn in the hospital. It is to be hoped that there may be a change in this method of recruiting patients, which should be left entirely to the discretion of the examining physician, aided by a lay committee to investigate the financial situation of the applicant.

THE VICTORIA HOSPITAL FOR CONSUMPTION.

THE OUT-DOOR DEPARTMENT AND THE CRAIGLEITH HOSPITAL.

Among the many medical institutions which I visited in Scotland, the one which interested me most was the above-named. It was then only in its infancy, but has since grown steadily, and now gives great promise for the future.

For the interesting facts concerning the history of the institution I am indebted to Dr. R. W. Philip, F.R.C.P.ED., in whose company I visited the institution in the fall of 1894, and to whom great credit is due for his energy and devotion to the enterprise.

In 1887 it was proposed that the Local Jubilee Memorial for Edinburgh should take the form of a scheme for the relief of consumptives and other sufferers from chronic diseases. Impressed by the fitness of the suggestion, a citizen waited on one or two of those who were prominently associated with the loyal movement, to urge the suitability, for the purpose in view, of a hospital devoted to the treatment of consumptive patients. The result of the deliberations regarding the memorial was as unsubstantial as were the fears expressed regarding the success of the hospital. There was no local memorial, and nothing was done for the tuberculous poor.

OUT-DOOR DEPARTMENT.

Disappointed at this turn of affairs, the promoters of the hospital movement commenced work on their own account. A committee was formed, and three rooms were hired in 13 Bank Street, as the nucleus of an out-door department. Within a few weeks from its opening, on the 22d of November, 1887, the limited resources were taxed to the uppermost and the waiting-room crowded to overflowing. The next step was the acquisition of larger premises at 26 Lauriston Place. These were adapted so as to afford sufficient accommodation for a large out-patient department, for which they have been in use since. They comprise two large consulting-rooms, one for new and the other for old patients, with dark-room fitted up for laryngoscopical examination, one large and two smaller waiting-rooms, a laboratory for microscopical and bacteriological work, a small dispensary for the supply of drugs to those of the out-patients who require such help, and a dwelling-house for the officer.

The out-patient department is worked in the following way : After the patient's name and address have been entered in the books, notes are made of his condition on sheets arranged for the purpose, and a graphic report of the physical signs recorded on outline charts. Careful inquiry is pursued along certain lines, with the view of determining the frequency of causal and concomitant conditions. The larynx and expectoration are examined in the greater proportion of the cases, with the object of obtaining further evidence of tuberculosis. No patient is seen on a subsequent occasion, without the record of his condition and of the treatment which has been followed. A register of the patient's weight is made on each visit.

If the condition be urgent, more particularly if there be evidence of rapid progress, much pyrexia, hæmoptysis, or other serious symptom, the patient is placed on a list for out-door visiting by a qualified medical officer of the institution, the list being restricted to cases of tubercular disease.

In order to disseminate knowledge of the proper measures to be adopted in the treatment of tubercular patients, printed instructions of a simple character are issued to all such patients or their friends. Besides the instruction given to the patients by the physicians, and through the printed directions, the dispensary officer, who is an old soldier, trains many of the younger subjects with deformed chests in suitable dumb-bell and other exercises. Important service of a beneficent character has been rendered by the institution of a Samaritan committee, in connection with the out-door department. This consists of some twenty ladies, who, in co-operation with the medical officer, undertake the home-visiting of the bedridden cases and the distribution to really necessitous persons of invalid comforts. This department of the work has been of incalculable service. These labors have been assisted not infrequently by the kind offices of nurses from the Queen Victoria's Jubilee Institute and other organizations.

The attendances at the out-door department have been very large, varying from some thirty to as many as eighty-seven patients on one afternoon. In addition to this, the list of home-visits paid by the medical officer has amounted to over one hundred and forty per month.

THE HOSPITAL.

The successive steps in the elaboration of the out-door department served to prove in most forcible fashion the necessity for a hospital where a selected number, at least, from the mass of tubercular cases might be received for more special in-door treatment. The obtaining of this was no easy task. Many conditions had to be fulfilled, and funds were needed. After much consideration and more than one disappointment, the acting committee, who took the matter warmly in hand, were fortunate in obtaining a lease of Craighleith House. This is a fine old property, little more than a mile to the northwest of the west end of Princes Street, easily accessible both by railway and car. The substantially built mansion-house is charmingly situated in the midst of some seven and a half acres of prettily disposed grounds. It basks in the sun, facing due south, and, without being overshadowed, is sheltered on various sides, more particularly on the east and northeast, by lofty trees. The property is suitably laid out with walks, a high-walled garden, and park, which have proved a great boon to the patients.

Entrance was obtained in March, 1894. Various structural alterations were speedily undertaken, so as to adapt it for hospital purposes. These were completed by the beginning of August, when patients were received at once.

The Victoria Hospital for Consumption, as at present arranged, comprises: (1) basement-floor, containing kitchen, scullery, larder, pantries, and nurses' hall; (2) ground-floor, containing two male wards with three beds each, house-physician's sitting-room and bedroom, dispensary, and bath-room and lavatory accommodation for male patients; (3) first floor, containing three large and two smaller female wards available for eight patients, lady superintendent's sitting-room and bedroom, and bath-room and lavatory accommodation for female patients; (4) second floor, containing bedrooms for two nurses and three maid-servants.

A large, open courtyard back of the house contains buildings which include an observation ward, wash-house and laundry, lavatory accommodation for the staff, disinfecting chambers, coal-cellars, etc. Removed from the hospital, more than one hundred yards to the northwest, lie the mortuary and other offices. The porter's lodge is occupied by the gatekeeper and gardener.

The house was opened on the 9th of August, 1894, and since

that date has had its full complement of patients. The Victoria Hospital was the first consumption hospital in Scotland. Up to the 31st of May, 1895, sixty-two patients have been under treatment, and the results have been satisfactory.

The climate of Scotland is certainly not one to be considered as ideal for the treatment of tuberculous invalids. The good work done and the excellent results obtained by Dr. Philip and his associates is the best plea for sanatoria for the consumptive poor of all climes.

INSTITUTIONS FOR THE TREATMENT OF TUBERCULOUS PATIENTS IN THE UNITED STATES AND CANADA.

THE ADIRONDACK COTTAGE SANITARIUM.

The Adirondack Cottage Sanitarium is located one mile to the north of Saranac Lake, a village situated on the northern part of what is known as the Adirondack Plateau, in New York State. This region has an elevation varying from fifteen hundred to eighteen hundred feet above sea-level. It is heavily wooded with pine, spruce, fir, Canada balsam, maple, birch, and beech, and has an almost uniformly sandy soil.

The plateau is studded with many beautiful lakes and mountains, the latter varying in elevation from two thousand five hundred feet to five thousand feet above sea-level. The lakes are fed by springs and mountain streams, which render the water exceptionally clear, and, owing to the small amount of dissolved salts, it possesses but little hardness.

In the heart of this plateau, with fifty to one hundred miles of forest in all directions, lies the village. It is located in a sheltered valley one mile from the Lower Saranac Lake, and is built on sandy plains and hill-sides along the Saranac River. It is protected from winds by mountains to the north and northwest, while the long range to the southeast and east of heavily wooded peaks unquestionably influences the climate by breaking the force from that source, besides making scenery of peculiar beauty.

The founder of the sanatorium has kindly sent me such a good description and history of the institution that I will reproduce it in full:

"The Adirondack Cottage Sanitarium was the first institution in

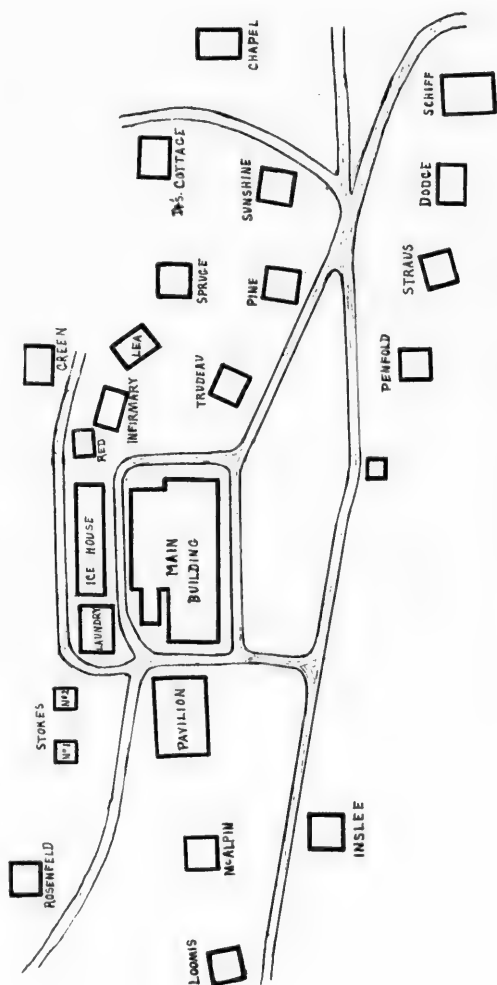


FIG. 38.—ADIRONDACK COTTAGE SANITARIUM, SARANAC LAKE, N. Y.

America to attempt to cure incipient pulmonary tuberculosis in persons of moderate means. It had its origin, fifteen years ago, in a desire on the part of its founder, Dr. E. L. Trudeau, to extend the benefits of sanatorium methods and an open-air life, spent under good climatic influences, to working men and women whose lives are constantly sacrificed on account of their pecuniary inability to avail themselves of these means of restoration.

"In 1884, by personal appeals, a few thousand dollars were obtained, with which one small cottage and the wing of the intended



FIG. 39.—MAIN BUILDING OF THE ADIRONDACK COTTAGE SANATORIUM.

main building were erected. Each year the work was developed step by step, and the running expenses met principally through the generous aid of the guests at Paul Smith's, Saranac Inn, and other hotels in the region, who held annual fairs during the summer for the benefit of the institution. Its growth has been steady and uninterrupted, until a small village consisting of twenty-two buildings now stands on the original site where, fifteen years ago, the institution made so humble a beginning.

"In order to protect patients against the evils of aggregation the cottage plan has been adopted, in spite of the greater cost of build-

ing and operating an institution on this plan, and the sanitarium is now composed of a collection of eighteen small cottages and several other structures, grouped about the main or administration building.

"The cottages of the Adirondack Cottage Sanitarium are one-story buildings, which accommodate from two to ten persons, but the greater number have a capacity for four or five inmates only, and these have been found the most satisfactory. Each patient has his own room, which opens into a central sitting-room in direct communication with the veranda, on which the out-door plan of treatment is carried out. The partitions between the sleeping- and general sitting-rooms reach but seven feet from the floor, an arrangement which gives the patient the benefit of the entire air-space of the cottage, and allows of its being heated by a single fireplace or stove located in the general sitting-room; but the walls which separate the sleeping-rooms from each other reach to the ceilings, and are of solid construction. Good ventilation is insured by transoms located over the front veranda.

"In the main or administration building are to be found the dining-room, kitchen, reception- and general sitting-rooms, superintendent's and doctor's offices, and rooms for servants and nurses, while the upper floor of the building is devoted to large rooms for a limited number of patients. The library, recreation pavilion, doctor's cottage, chapel, and infirmary are all separate buildings. Should any patient in one of the cottages become rapidly worse or be taken suddenly ill, he is at once removed to the infirmary, where every convenience for his care and proper treatment is at hand. The separation of those who are failing rapidly, or are acutely sick, from the comparatively well, not only furnishes the former with the constant and necessary attention and nursing which they require, but withdraws them from the daily observation of their more fortunate cottage-mates, and prevents in these the depression of spirits which would otherwise occur from the contact with the very sick. The success of this plan is attested by the general cheerfulness of patients while in the institution, who, contrary to what might be supposed, are very rarely depressed in spirits at their enforced exile.

"The efficacy against infection which the immense air-space allotted to each patient by the plan of construction affords, as well as the protection given by the care taken of the expectoration, is



FIG. 40.—SOME COTTAGES OF THE ADIRONDACK COTTAGE SANITARIUM. (Summer View.)



FIG. 41.—SOME COTTAGES OF THE ADIRONDACK COTTAGE SANITARIUM. (Winter View.)

shown by the fact that the dust of the various buildings which have been occupied by consumptives failed to infect guinea-pigs when injected subcutaneously in these susceptible little animals, and that during thirteen years not a single employee has been known to have contracted tuberculosis.

"The treatment consists in the judicious application of an open-

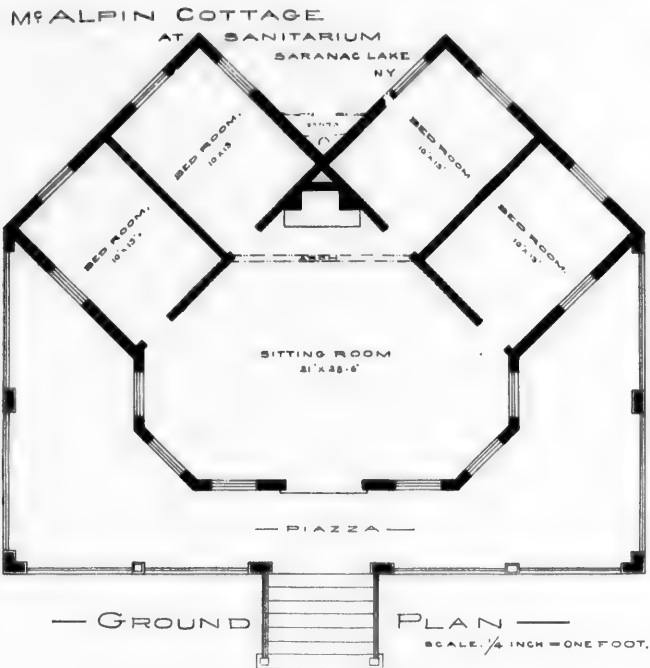


FIG. 42.

air life, rest, and proper feeding, with regulation of the patients' habits and mode of life, in a climate which has shown a marked tendency to improve the general nutrition of pulmonary invalids; and the methods do not differ materially from those in use in the well-known foreign sanatoria, except that much more liberty is given the patients, owing to the fact that the great majority of them

are in the incipient stage of their disease and practically apyretic. A medical examination by one of the examiners of the institution in New York, or by Dr. Trudeau at Saranac Lake, is strictly required, and only patients in the incipient stages of tuberculosis, or suffering from the less acute types of the disease, and who cannot afford to pay the usual prices at the hotels and boarding-houses, are admitted.

"The patients pay five dollars a week, and the actual cost of maintenance is about eight dollars and a quarter per patient, the deficiency being made up by annual subscriptions and fairs held at Paul Smith's and Saranac Inn, and occasionally in the past at other hotels in the region. There is a small free-bed fund, the income of which, as well as any subscriptions received for this purpose, is applied to the free maintenance of deserving patients whose means are exhausted.

"Each year any surplus remaining over and above the necessary expenditure, as well as any subscriptions which could be procured for this object, has been put aside as a nucleus for an endowment fund, and about one hundred and thirty thousand dollars of the five hundred thousand necessary for this purpose have already been secured. It is to be hoped that by subscriptions and bequests the endowment fund will continue to grow, so that the benefits of the institution may be made more generally available, and its permanence ultimately assured for all time."

I have visited this interesting institution in winter and in summer. The results obtained in both seasons are equally good; if there is any difference it is always in favor of the winter.

The year-round climate may be briefly described as cool and stimulating. The average mean temperature for Saranac Lake is 41.5° F.; that of New York City, for comparison, is 51.5° F. The mean temperature by months (taken from "U. S. Weather Reports" for Saranac Lake) is as follows:

Month, . . . Jan.	Feb.	Mar.	April	May	June	Year
Mean Temp., . 17°	15.4°	25.7°	40.1°	55.1°	63°	
Month, . . . July	Aug.	Sept.	Oct.	Nov.	Dec.	41.46°
Mean Temp., . 66°	2.3°	56.8°	42.7°	32.7°	32.2°	

Like all elevated places, the range of temperature during the twenty-four hours may be considerable at times. The average

mean daily range is 22.5 degrees. This insures cool nights in summer, though the midday temperature is never so high as in the southwestern resorts of like elevation and greater dryness. Frequent showers in summer and snowfalls in winter keep the air very pure and free from dust.

The institution is and has been since its inception in charge of Dr. E. L. Trudeau, whose services are rendered gratuitously, as are those of Dr. E. G. Janeway, Dr. Walter B. James, and Dr. H. P. Loomis, who examine patients for admission in New York City. There are two resident physicians, Dr. W. H. Jamieson and Dr. J. Wilder.

The late Professor Alfred L. Loomis was also deeply interested in the welfare of this institution. He gave his valuable services without remuneration as medical examiner from the beginning of the institution up to the time of his death.

SANITARIUM GABRIELS.

As a new institution in the Adirondacks we must mention Sanitarium Gabriels, near Paul Smith's Station, on the N. Y. C. & H. R. R. R.

The institution, for which Dr. Seward Webb and Mr. Paul Smith generously gave the land, was formally opened on July 26, 1897. The administration building is at walking distance from the depot. The post-office address is Gabriels, N. Y. The buildings stand on Sunrise Mount, which is about two thousand feet above sea-level, almost surrounded by State lands, on which there are thousands of acres of pine, balsam, spruce, etc.

The sanatorium is on the cottage plan, in detached buildings. The architect was the Hon. I. G. Perry, of Albany. The cottages are of hard wood, so as to permit of a thorough disinfection as often as may be necessary. The "Sun Room" in the new infirmary building is the gift of ex-Governor Morton, and is called the "Anna L. Morton Room." A special feature of the buildings is the facility for heating and ventilating them. They are heated by indirect radiation from a central plant. The boiler-house is located about eight hundred feet from the main building, as protection against fire and to prevent the patients being disturbed by the dust and noise of the machinery. The pure air from without is forced through a shaft into the buildings, and heated on its way

by radiating pipes. One breathes the same pure atmosphere as when out-of-doors. The system is so nearly perfect that the air can be changed throughout the buildings every five minutes. The quality and abundance of the water-supply are remarkable in the Adirondacks. The analysis proves the water a perfectly pure spring, and yet as soft as rain for bathing, etc. The institution is supplied with complete installations for hydrotherapeutic applications. Of the regulations I desire to copy the following from the recent announcement:

"Only those who are in the first stages of consumption or convalescing from other pulmonary diseases are admitted as patients.



FIG. 43.—SANITARIUM GABRIELS.

"Persons from a distance making application should be examined by one of the consulting physicians, and have a written certificate from him.

"Medical attendance is free. The charge per week is from seven to twelve dollars, according to location of room. Washing and medicine form an additional charge. Patients requiring attendance in rooms will be charged extra.

"The plan of the sanatorium is such that it will reach both rich and poor; elegant rooms, careful nursing, every comfort and luxury will be afforded the one at a moderate price, and, as the Sisters receive no personal remuneration, the money given for this purpose will be expended on the other. The good and charitable have already

come forward to assist in this noble work, but much remains to be done. The Sisters have built well and substantially, trusting Providence. Already over sixty thousand dollars have been spent on the institution; but the bulk of this sum has been expended on the drainage and water-supply. About seventy patients can be accommodated."

At my visit last year there was no house-physician yet. But I have since received a letter from the Sister Superior stating that Dr. J. C. Lamb is now the house-physician of the institution.

LOOMIS SANITARIUM FOR CONSUMPTIVES.

Liberty, in Sullivan County, in the State of New York, was considered by the late Dr. Alfred L. Loomis as an ideal situation for a sanatorium where tuberculous patients, after a few hours' journey from New York, would find themselves 2200 feet above the sea-level, in an air similar to that of Colorado and the Adirondacks.

In the winter of 1894 a meeting of the Woman's Auxiliary of the Hospital Saturday and Sunday Association took place at the house of Mrs. Richard Irvin, who, having Dr. Loomis's idea in mind, determined to win an interest in it by telling of a young girl who was dying of consumption in an inner tenement, and for whom she had tried in vain to gain admission to a hospital.

The urgent need for a hospital for consumptives was so impressed upon the audience that at the close of the meeting a woman present offered \$1000 toward the opening of such an institution.

From this beginning the work gradually developed. The renting of a small house at 230 West Thirty-eighth Street was soon followed by the purchase of 193 acres of land not far from Liberty, where it was hoped in the near future to build a sanatorium for the treatment of incipient phthisis, on the lines so much desired by Dr. Loomis.

Then came the death of this distinguished and beloved physician, and, following it, the noble gift of the sanatorium as a memorial of him by Mr. J. Pierpont Morgan.

The sanatorium was incorporated on January 24, 1896, and opened to the public on June 1st. It is situated two miles west of Liberty, and stands on the southern slope of a hill crowned with forests and girt by a caverned ledge. It forms a picture full



FIG. 44.—LOOMIS SANITARIUM AT LIBERTY.

of beauty, sunshine, and refinement. The ample grounds, attractively laid out with graveled walks and drives, command an extensive and uninterrupted view of the surrounding country for many miles.

The Loomis Memorial and Administration Building, built of roughly hewn graystone and timber, designed by Mr. Bruce Price, stands on a plateau on the highest part of the grounds, and looks over a rarely beautiful expanse of mountain and valley. The dimensions are 190 feet by 60 feet. It is three stories high, and contains reception-room, library, dining-room, offices, drug-room, butler's pantry, kitchen, store-room, and laundry on the first floor. The second floor has a solarium, four emergency wards, laboratory, nurses' rooms, baths and closets, sleeping-rooms for house staff, and guest-rooms. On the third floor are servants' quarters and store-rooms. All the charm of modern decoration and furnishing is shown in the interior, and every modern appliance equips the house. Over the mantel in the library a bronze tablet, with palm- and laurel-branch on either side, bears the following inscription: "This building is erected in loving memory of Alfred L. Loomis, M.D. To be used as a Sanitarium for the treatment of Phthisis. 1831-1895."

Grouped around the main building, within a few hundred yards of it, are a casino and eight cottages. The casino, given by Mrs. George Lewis in memory of her husband, is a two-story building of stone and wood, fifty by sixty feet, with a huge fireplace and the attractions of a billiard-table, organ, piano, games, etc., for the amusement of the patients.

The sanatorium can accommodate about eighty patients.

Each building is heated by its own hot-water plant, and lighted from a central dynamo. There is a reservoir situated above the highest point of the sanatorium, into which water is pumped from a mountain spring, thus insuring a pure water-supply.

The staff consists of Dr. Stubbart (the physician-in-charge), and a house-physician. Dr. Walter F. Chappel, of New York, is the laryngologist of the institution.

There is a laboratory, furnished with all the necessary apparatus for bacteriological and experimental work; also a powerful "X-ray" apparatus and well-equipped throat-room.

The general idea of the sanatorium is that known as the cottage plan; patients are grouped in cottages short distances from the

main building, and, except in rainy weather, have daily exercise in walking back and forth for meals, and for the amusements at the casino.

The object of this sanatorium is to help persons in the incipient stages of phthisis to recover their health, who by reason of limited means are unable to go to more expensive resorts or to travel greater distances. Only those will be admitted who are in the early stages of consumption, and to whom a residence for a number of months in the sanatorium promises either a complete cure or such an improved condition that they can return to their homes and be able to carry on their work.



FIG. 45.—A COTTAGE, LOOMIS SANITARIUM AT LIBERTY.

As for the financial basis of the institution, Dr. Stubbart said to me, in a recent letter: "It is not a charitable institution, neither is it a money-making one; we aim to give the patients the very best of everything in the way of buildings, food, medical attendance, and comforts of all kinds that can be expected—that is, we plan to give them everything that they could obtain from money-making sanatoria charging \$25.00 to \$50.00 a week. Our rates are \$12.00, \$15.00, and \$20.00 a week; there are a few beds on which we hope in the future endowments will be placed, whereby each patient will receive from the beneficiary fund \$5.00 a week toward his expenses. You will therefore see that the aim of this insti-

tution is to reach a class of patients, first, who are able to pay their way absolutely; second, who are of good connection and personality, and yet who need a certain amount of aid—in other words, the sanatorium is supposed to receive refined people. To my mind, this is even a greater charity than that which reaches out to only the poorer elements of our cities."

Before patients can be admitted they must be examined by either Dr. H. P. Loomis, Dr. Charles E. Quimby, or Dr. A. A. Smith, of New York; or by Dr. J. E. Stubbert, at the sanatorium; or by some other member of the medical board.

Liberty is located on the main line of the New York, Ontario



FIG. 46.—A COTTAGE DRAWING-ROOM AT THE LOOMIS SANITARIUM.

& Western Railway, 119 miles from New York, and has an elevation of from sixteen hundred to eighteen hundred feet above tide—the greatest elevation reached on this railroad between New York and the Great Lakes. The atmosphere at Liberty is always invigorating; the nights are cool in summer, and the winds make even the hot days bearable. The winters are cold; the ground freezes up in November and remains so until late in the spring. The intense cold is less felt at Liberty than in the lowlands, and the patients, as a rule, enjoy the out-door life at Liberty as much in winter as in summer.

The last semi-annual report, dated May 1, 1898, which Dr. Stubbert had the courtesy to send me, shows the following remarkable

results obtained in the Loomis Sanitarium: "During the past six months 18 per cent. had lost their bacilli. During the first year 13 per cent. of the patients discharged were apparently cured, while during the past six months 23 per cent. of those discharged were apparently cured, and 70 per cent. of those discharged were either cured, had their disease arrested, or were so much improved as to be able to return to their work. Of the patients discharged after a residence of three months or less at the sanatorium 17 per cent. were apparently cured, while of those who remained more than three months 26 per cent. were cured."

The treatment in vogue at Liberty is the hygienic and dietetic



FIG. 47.—A BEDROOM AT THE LOOMIS SANITARIUM.

method, but Dr. Stubbart has also used recently the U. S. Government serum (of de Schweinitz) in a number of cases, and has noted a fair number of improvements under its administration. Dr. Stubbart believes more in exercise than most European and American phthisio-therapeutists. As a rule, he allows all patients whose evening temperature does not reach 100° F. to walk moderately, and if their temperature is not above 99° F. no restrictions at all are placed upon them in this respect, but they are allowed to gradually accustom themselves to pedestrian tours extending over from two to ten miles daily. He assures me, and also states in his recent report, that he has never seen any untoward results from

this exertion on the part of the patients, and he considers it a mistake to encourage any such cases to take the rest cure.

An interesting innovation has been inaugurated at Liberty by Dr. Stubbett by creating a nurses' training school. The course being two years, they receive a thorough training in the sanitary work of a sanatorium, and are lectured to twice a week by the different members of the medical staff. To nurse a consumptive is not always an easy task, and to train nurses in this special art is an idea for which Dr. Stubbett is to be congratulated.

The Loomis Sanitarium has also a city branch for consumptives, where the incurable cases are admitted. It is located at 104 and 106 West Forty-ninth Street. Attached to it is also an out-door dispensary. One of the houses is devoted absolutely to charity patients; and the other to those who are able to pay for their board (seven to ten dollars a week).

MONTEFIORE HOME COUNTRY SANITARIUM.

At Bedford Station, Westchester County, near New York, at an elevation of about four hundred and fifty feet, there has existed, since September, 1897, a little sanatorium which has grown and promises to become an important institution for the treatment of the consumptive poor. It constitutes an annex to the Montefiore Home for Chronic Invalids situated in the city of New York.

The institution comprises 130 acres. It gets its water-supply from an artesian well 400 feet deep, and has a storage tank of 32,000 gallons of pure, wholesome water. There is a farm attached to the institution, which supplies eggs, good milk, fresh fruit, and vegetables. The institution was opened with ten patients, but the need for additional accommodation made itself felt, and a pavilion with twenty-four beds was erected and opened in May, 1898.

The first annual report shows that 57 patients had been treated, of whom 5 were cured, 8 left in an improved condition, 15 were transferred to the Montefiore Home at One Hundred and Thirty-eighth Street and Grand Boulevard, New York, as their advanced condition of phthisis became detrimental to the surrounding incipient cases; 29 cases remained in the sanatorium at the time the report was finished.

The sanatorium had its inception through the generous gifts of Messrs. Bloomingdale and Schiff, and is exclusively for the con-

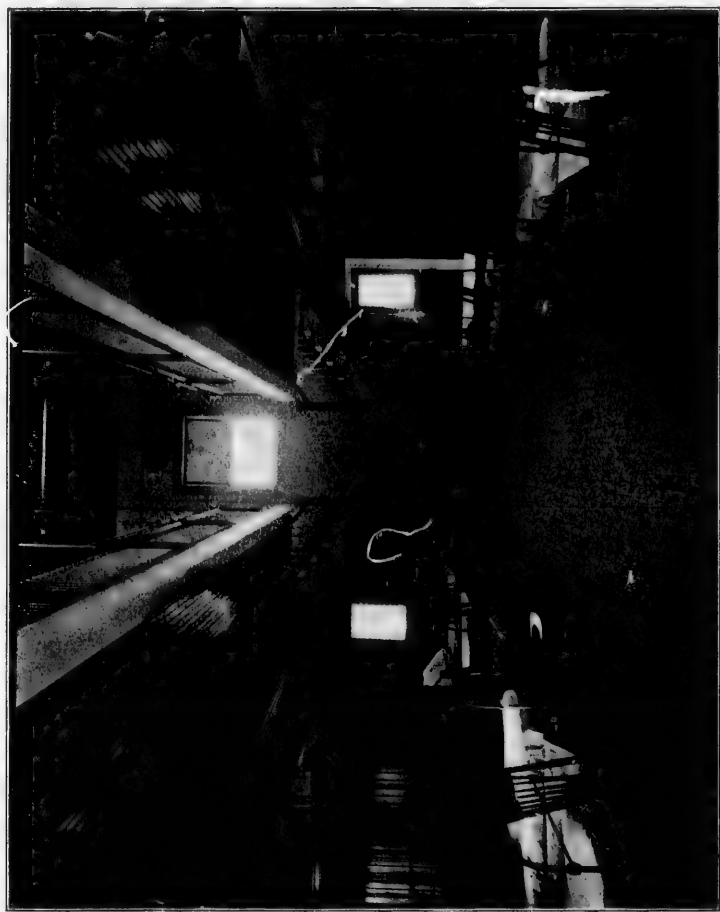


FIG. 48.—MONTEFIORE HOME COUNTRY SANITARIUM.

sumptive poor, which are selected from the applicants for admission to the Montefiore Home for Chronic Invalids. The house-physician of the institution is Dr. Herbert; the medical director, Dr. J. Fraenkel. It is the plan of the founders to add to the existing buildings some smaller cottages with separate rooms, more suitable for the care of tuberculous invalids than is the original large pavilion, which consists only of a large dormitory. I reproduce here a photograph of the latter, showing the neatness with which the institution is kept. For the benefit, however, of all those desiring to build sanatoria for consumptives, I must criticize the arrangement whereby twenty-four patients congregate at night in one large hall. To me it seems to be an utter impossibility to assure a good night's repose to these invalids, as among such a large number coughing will be heard more or less all the time, and thus they will disturb each other.

THE PASTEUR SANATORIUM.

Pasteur Sanatorium is the name given by Dr. Paul Gibier, Director of the Pasteur Institute of New York, to the sanatorium for the treatment of tuberculous patients at Suffern. In selecting this name Dr. Gibier desired to honor the memory of his celebrated teacher.

Suffern is a little village and station on the Erie Railroad, a short distance (about one hour by rail) from New York City. The sanatorium is situated at the foot of the Ramapo Mountains, in Rockland County, N. Y., at an elevation of 500 feet above sea-level. The laboratories of the Pasteur Institute and the model farm belonging to Dr. Gibier are also on the same property, which comprises about two hundred and fifty acres.

The sanatorium stands on higher ground than the other buildings, and the structure is built according to the best sanitary principles, and in compliance with the requirements of modern phthisiotherapy. It has a south and southwestern exposure, and is in the immediate vicinity of a grove of pine, chestnut, maple, and oak trees. There are verandas and balconies for the rest cure in the open air. The principal veranda is twelve feet above the ground, in front of the second story, and can be entirely closed by glass and transformed into a solarium in too cold and windy days.

The ground-floor is used for hydrotherapy and for bacteriological and "X-ray" work. On the main-floor are the dining-room,

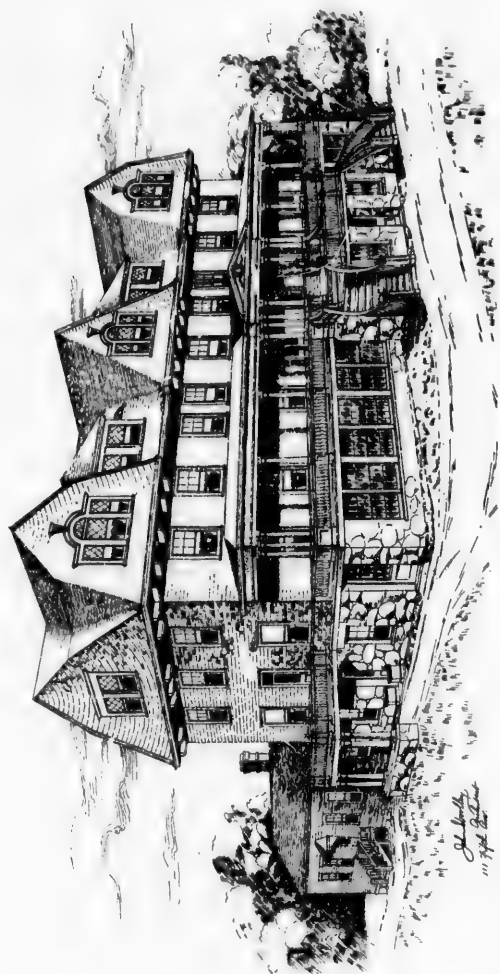


FIG. 49.—PASTEUR SANATORIUM.

parlors, library, billiard-room, music-room, etc. The kitchen, the laundry, the servants' rooms, and the machinery are in an annex, connected by a corridor. The sanatorium is provided with fresh vegetables and excellent milk from the farm. The cows are tested at regular intervals by a competent veterinary surgeon.

The woods surrounding the sanatorium and the Spitzberg Mountain near by offer pleasant excursions to the patients. The cottage of the medical director is about one thousand feet distant from the sanatorium, with which it is connected by telephone. The establishment is heated by hot water and lighted by electricity. A house-physician resides in the sanatorium.

The climate at Suffern is similar to that of New York, but the atmosphere is very much purer, and in summer it is less hot. The treatment in the sanatorium is the hygienic and dietetic method as prescribed by Brehmer, Dettweiler, and their followers. For the time being there is accommodation for about thirty patients. A number of beds, however, are destined by the founder of the sanatorium for the reception and free treatment of poor tuberculous physicians of whatever nationality, school, or religion. The price for room, board, and medical attendance varies, according to the location of the rooms, from twelve to twenty-five dollars a week. An additional pavilion is projected. The accompanying cut gives a general idea of the external appearance of the establishment.

SETON HOSPITAL.

At Spuyten Duyvil, within the precincts of Greater New York, there was erected, in 1894, a majestic building for the care and treatment of the poorer classes of consumptives. The building faces Spuyten Duyvil Parkway, and can be reached within twenty-five minutes from the Grand Central Station. It stands on high ground (250 feet above the level of the sea), and from its balconies one has a fine view over the Hudson. The wards of the institution are large, airy, and cheerful. Each has a capacity of twelve beds. There is a system of fans and ventilators, maintaining an even temperature in the building. One of the chief attractions of the institution is a large solarium filled with growing-plants, where in cold and stormy weather the patients delight to congregate.

The institution is under the charge of the Sisters of Charity, and can accommodate 160 patients. The patients pay for their

board only (five dollars a week). With the beginning of the year 1898, the Seton Hospital took charge of the consumptive poor of the city of New York, selected by the Board of Health, for which they receive one dollar a day for each patient. The house-physician is Dr. Paffard, and Drs. Jackson and Shrady are visiting physicians.

ST. JOSEPH HOSPITAL FOR CONSUMPTIVES.

This institution, one of the most important of its kind in the city of New York, covers the entire block situated between St. Annis and Brook Avenues and One Hundred and Forty-third and One Hundred and Forty-fourth Streets. This hospital is owned and conducted by the Roman Catholic order of the Sisters of St. Francis. It was opened in 1882, as the Sisters found it impracticable to care for consumptives in their general hospital in East Fifth Street. The original building was situated in One Hundred and Ninth Street, and the present edifice was not occupied before January, 1889. There is a nice garden attached to the grounds. The main building is a four-story structure, facing south, with east and west wings. It is lighted by gas and heated by hot-air furnaces. The ground-floor is divided into waiting-rooms, sitting-rooms, offices, examining-rooms, small wards, etc. The three upper stories are each divided into five large wards, five small wards, and a few single rooms. The chapel occupies a separate extension. In the rear of the main building, but separated from it, is a house devoted to the use of incipient and arrested cases of consumption. Farther in the rear are the power-house, the stable, workshop, etc.; and in the extreme northwest corner the mortuary, with separate entrance from the street.

The hospital contains 350 beds, more than 300 of which are entirely free and constantly occupied by the sick poor, who are admitted irrespective of nationality, race, or religion. Patients in all stages of the disease are received and many beds given up to those far advanced in consumption, for whom only relief from suffering during their last days is expected. An average of 1500 patients is treated each year. Apart from the individual good which these consumptives may derive from hospital care and instruction in the disposal of sputa, etc., an incalculable benefit is conferred upon the public at large, as well as upon their friends and families, by removing the invalids to a place where they cease

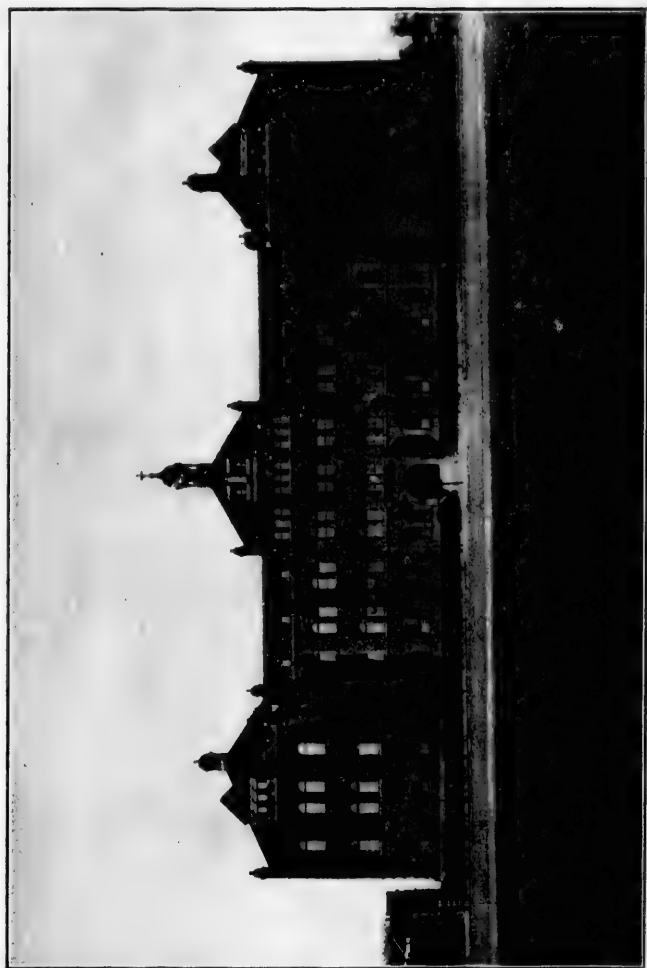


FIG. 99.—ST. JOSEPH HOSPITAL FOR CONSUMPTIVES.

to be centres of infection, and where they no longer hamper the wage-earning capacity of the remaining members of their families.

The institution is not endowed. It is supported by the voluntary contributions of its friends and a benevolent public.

The physician-in-chief of the St. Joseph Hospital is Dr. Chas. M. Cauldwell. The consulting physicians are Drs. John Dorning and F. E. Miller. Drs. Starke, Morrissey, Holmes, Burke, T. J. Larkin, Butler, Wollner, Howley, Smith, Murray, Dunphy, Spence, J. H. Larkin, Sutorius, Loughran, Schwerd, Skeel, J. P. Burke, and Heuel are visiting physicians and surgeons.

THE HOSPITAL FOR DISEASES OF THE LUNGS AT CHESTNUT HILL, PHILADELPHIA.

Under the auspices of the Philadelphia Protestant Episcopal Mission there flourish several philanthropical institutions. Among these there are two consecrated to the care of the consumptive poor. One is the "Hospital for Diseases of the Lungs" for female patients, situated at Chestnut Hill; the other is the "House of Mercy" for male consumptives, at 411 Spruce Street, with a capacity of twelve beds. Concerning the latter, I only wish to give a report of the work done during the year 1897. Forty-three patients were received during the year; 11 were discharged improved; 14 were discharged not improved; 7 died, and 11 remained under care. When one considers that this institution admits consumptives at any stage of the disease, the good work done, though on a small scale, speaks for itself.

Of far more importance, and on a larger scale, is the work done at the Chestnut Hill institution, which can accommodate eighty patients. I visited this hospital some time ago under the kind guidance of Dr. J. Solis-Cohen, and was charmed with its situation. It has an elevation of 500 feet above tide-water, and is at a distance of twelve miles from the City Hall of Philadelphia. The institution consists of a series of buildings and cottages with sun-parlors, etc., of one of which I give an illustration. The hygienic arrangement is most excellent. With few exceptions, every patient has a room for herself. The central administration building contains parlors, doctors' offices, drug-room, dining-room, kitchen, and dormitories for the staff and help. The cottages are connected with the main building by covered passage-ways. The heating is



FIG. 51.—THE SUN-PARLORS OF THE ANNA H. WILSTACH COTTAGE, CHESTNUT HILL, PHILADELPHIA.

done by indirect radiation, the boiler-house being situated 300 feet from the nearest cottage.

For both institutions (the "House of Mercy" and the "Chestnut Hill Hospital") the conditions for admission are alike. The patients must be suffering with disease of the lungs in some form, and the question of money does not enter into the admission at all. Patients of any religious denomination are received.

The treatment in the institution is hygienic, dietetic, and symptomatic as carried out in German sanatoria, though galleries with reclining chairs for the rest cure proper did not exist at the time of my visit. There is a special department for diseases of the throat under the charge of Dr. A. W. Watson. The visiting physicians are Drs. J. Solis-Cohen, F. P. Henry, E. W. Watson, and W. M. Angney. Dr. Robert L. Pittfield is the bacteriologist of the institution. The house-physician is Miss Anna L. Bacon, M.D. The superintendent is the Rev. L. Duhring.

One hundred and twenty-one patients have been treated during the year, of which 14 were cured, 18 improved, 12 unimproved, and 21 died. Here, too, even advanced cases are admitted, and the reported results show what can be accomplished in our Eastern climates by persistent hygienic and dietetic care, combined with open-air treatment.

RUSH HOSPITAL FOR CONSUMPTIVES.

When on a visit to Philadelphia recently, I was delighted to learn of the prospects for the future growth of the Rush Hospital for consumption and allied diseases. This institution is situated at the northwest corner of Lancaster Avenue and Thirty-third Street in the city of Philadelphia. The building first consisted of a substantially constructed mansion, in which fifteen patients could be accommodated, with rather undue crowding. Recently there has been added a wing, extending northwest from the original building, seventy-two feet by twenty-two feet. On the ground-floor in this extension are a waiting-room, prescribing-rooms for outdoor patients, an apothecary shop, and a little sun-parlor. On the second floor is a ward which can accommodate fifteen patients, and on the third is another ward which can accommodate the same number, with convenient bath-rooms, linen-closets, etc. Forty patients can now be accommodated in the main building without any crowding.

Patients are admitted in the various stages of the disease, and it is to be hoped that the noble efforts of the Women's Board of the Rush Hospital will be crowned with success. The Rush Hospital is confined to the treatment of the patients, and it is not in any sense a home for consumptives. It is supported by voluntary contributions, to which have been supplemented, for six years



FIG. 52.—RUSH HOSPITAL FOR CONSUMPTIVES.

past, an annual appropriation of \$5000 from the State of Pennsylvania.

There is a large medical staff of consulting and visiting physicians, composed of such men as Stille, Curtin, Musser, Mays, Griffith, S. Solis-Cohen, Tyson, and others, which guarantees to the institution a bright and well-deserved future.

SHARON SANITARIUM.

To Dr. Vincent Y. Bowditch, of Boston, belongs the credit of being the first in this country to inaugurate the sanatorium treatment for the consumptive poor near large cities without any consideration to special climatic conditions. Thanks to his devotion to the cause, and to the generosity of wealthy people of the city of Boston, the Sharon Sanitarium, at Sharon, near Boston, was erected in 1891 for the treatment of consumptives. Its object is to

admit people of very limited means, like teachers, shop-girls, etc. and not the wealthier classes. It is chiefly supported by public subscriptions.

The Sharon Sanitarium is a large, wooden building situated on a high, gravelly knoll which slopes toward the south, at an altitude of about four hundred feet, and is sheltered on the north, west, and east by heavy pine-woods. It was built especially for the purpose, and can accommodate at present only fifteen women patients, but in the future the directors hope to obtain sufficient funds to erect



FIG. 53.—SHARON SANITARIUM.

cottages near the present building for the accommodation of both sexes. It is so constructed as to obtain as much fresh air and sunlight as possible, by means of numerous windows and open fireplaces in every room.

Each patient has her own special bedroom. Broad piazzas enable the inmates to be much of the time out-of-doors, even in the coldest weather, either walking or lying, well wrapped up, in reclining chairs. The interior walls are painted, not papered; the floors are of hard wood, both being frequently wiped or mopped

with damp cloths, and are never dusted or swept. Rugs, and no fixed carpets, are used.

The strictest rules are made for the destruction of sputa. Large cuspidors filled with damp sawdust are on the lower floor, and the contents destroyed by fire. The "Sanitas" paper cups are used at the bedside; and when upon the grounds each patient is provided with a rubber pouch filled with a roll of Japanese paper, which is destroyed also by fire upon the patient's return to the house. In short, every precaution is taken to prevent possible infection from the chief source of danger, according to our present knowledge—the dried sputa.

To judge from the reports which I saw when I visited this interesting institution, and which Dr. Bowditch has the courtesy to send me from time to time, all those who feel that the problem of the tuberculous poor must be solved by the creation of sanatoria near the large centres of population cannot but feel highly encouraged by the work done at Sharon.

THE MASSACHUSETTS STATE HOSPITAL FOR CONSUMPTIVES AND TUBERCULAR PATIENTS.

The opening of the Massachusetts State Hospital for Consumptives marks an era in the history of modern phthisio-therapy. It is the first State in this country to take care of its consumptive poor. The hospital—wrongly called "hospital," for to my mind it deserves, more than any other, the name of "sanatorium"¹—is located at Rutland, Mass., on the Central Massachusetts Railway, twelve miles from Worcester, about twelve hundred feet above sea-level. The construction of the hospital was authorized by an act of the Legislature of the State of Massachusetts in 1895. It was opened for the reception of patients on October 1, 1898.

The institution consists of a series of two-story buildings arranged in a half-circle, in the middle of which is the administration building. The pavilions are of two kinds: some have seven small rooms and a large ward for twenty-two patients, and others have the same number of separate rooms, but the wards are smaller and can accommodate only ten patients. Each pavilion has a solarium made entirely of glass, and all the buildings are encircled by large

¹ See foot-note on page 200.

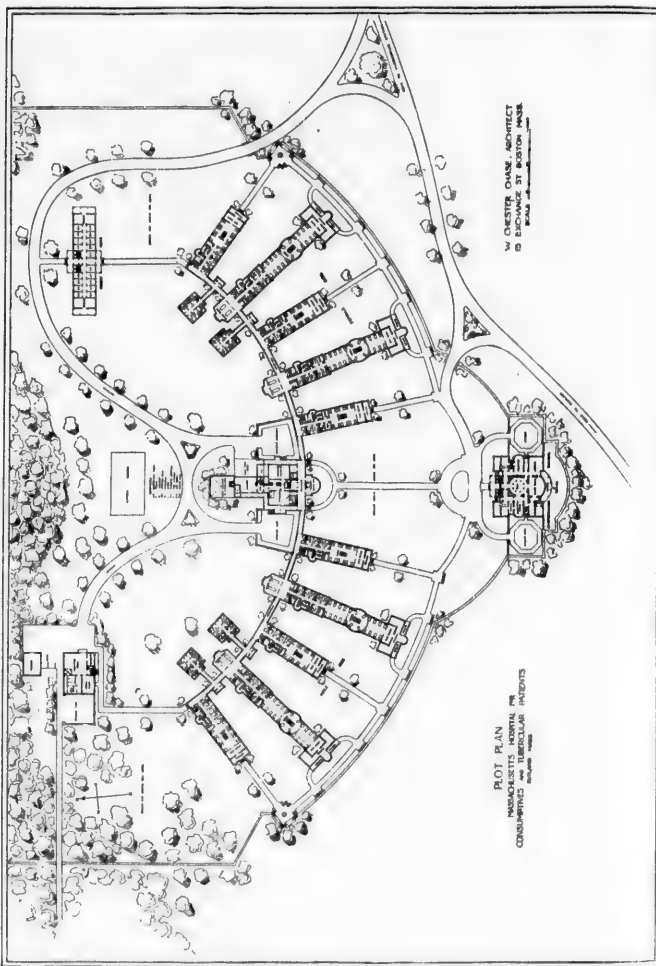
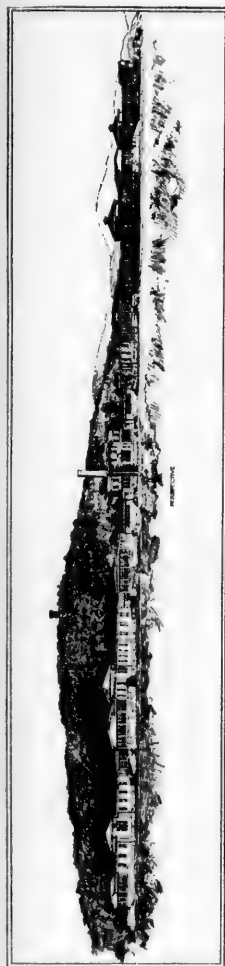


FIG. 84.—MASSACHUSETTS STATE HOSPITAL FOR CONSUMPTIVES.

verandas. The pavilions on one side of the administration building are for women and those on the other side are for men. As the accompanying illustration shows, the buildings are all arranged so as to receive as much sun as possible. There are in all 200 beds. Patients can have their choice in regard to the treatment—that is to say, whether they desire to have a regular or a homœopathic physician for their attendant.

What makes this institution particularly interesting is that, inasmuch as its primary purpose is to arrest the disease, and if possible to extirpate it, only such patients will be admitted as are deemed not too far advanced to admit of reasonable hope of radical improvement. In no sense is the hospital to be considered as a home for the hopelessly sick; for, great as is the recognized need for homes of refuge for advanced consumptives, such service is manifestly incompatible with the even more needed service of rescuing lives that can be saved only by sanatorium treatment. "Patients who do not improve after a stay in the hospital sufficiently long to test the effect of treatment will be advised not to remain, and their friends will be expected to arrange for their removal to surroundings primarily devoted or better adapted to their comfort."

This is a clause contained in the opening announcement, and is one of the most distinct features of the work of the institution. The fact that the charges for patients are uniform and only fifty cents a day, that no private patient will be received, and that private rooms will be allowed only for physical reasons, and, finally, that no extra charges will be made and no fees and tips allowed to be accepted under any circumstances, makes this institution in the truest sense a philanthropical one.

The visiting and examining physicians are Drs. Vincent Y. Bowditch (regular) and Herbert C. Clapp for the homœopathic division. The medical superintendent, who resides at the Rutland institution, is Dr. Walter J. Marclay.

THE FREE HOME FOR CONSUMPTIVES IN THE CITY OF BOSTON.

Realizing the necessity of a non-sectarian home for poor consumptives, the Young Ladies' Charitable Association (whose object is to care for the sick poor) was organized in March, 1891. It purchased a large estate in Dorchester, Mass., and in March, 1892, after making necessary alterations in the mansion-house, opened

the original building under the incorporated name of "The Free Home for Consumptives in the City of Boston."

The great number of applications for admission has necessitated the erection of a larger building, which has just been completed. The buildings, consisting of the administration building, a portion of which is used for nurses and attendants, and the main building, which has accommodations for over one hundred and twenty-five patients, are constructed of wood in the colonial style of architecture, and are set back from the street a distance of 150 feet. The grounds facing the street are laid out and planted, and a large space in the rear of the administration building is reserved as a recreation field for the patients.



FIG. 55.—GENERAL VIEW OF THE FREE HOME FOR CONSUMPTIVES IN THE CITY OF BOSTON.

In planning these buildings the purpose was to secure an arrangement embodying all the salient features which are so important in a hospital of this kind, and also to make it homelike as well. This result was attained, as will be seen by the plan, by placing the various wards on the southern side of the main corridor, which runs the entire length of the building, and connecting them by large sliding-doors with a recreation hall in the centre, which is open to the third floor. Here concerts are given once a week by the different district committees which compose the Young Ladies' Charitable Association, thus affording those patients who are unable to be about an opportunity of sharing the enjoyment with their more fortunate companions.

The dining-hall, serving-kitchen, toilet-rooms, reading-rooms,

linen-rooms, and rooms for patients' clothing, are located on the north side of the corridor. At the extreme end of the main corridor are grouped the wards for isolated patients, which are shut off from the rest of the building, and are fitted up with toilet-rooms, etc., for their use.

The front entrance, which is used for visitors, is through a vestibule into a large, central hall, which is finished and paneled in quartered oak, and is made attractive by a large, open fireplace, and a spacious staircase which leads to the second and third floors. Grouped about this hall are the reception-room, nurses' parlor, and the throat- and consulting-room, which is also easy of access from the administration building, adjoining it on the left. The consulting-room is fitted with toilet, etc., for the use of the doctors, and it also has an open fireplace, which gives it a cheerful appearance and affords an excellent means of ventilation. In the basement are located the laundry, drying-room, inhalation-room, fumigating-room, kitchen, etc. The second floor is arranged in much the same manner as the first floor, with the exception that on the south-west front are two additional wards, accommodating eight beds each, and a small chapel over the first entrance.

The building is finished in brown ash and quartered oak, and the floors throughout, except the rooms in the basement, are laid out with rift hard pine. As a protection against fire, brick walls have been introduced every fifty feet, which run clear across the building, in the openings of which are hung metal, fireproof doors, so that in case of fire the doors may be closed and the fire confined to any particular section. The plumbing has been arranged according to modern sanitary principles. The heating and ventilating system is known as the plenum or fan system. The air is introduced at a central point and passed over tempering coils, and heated to a temperature varying from 60° to 70° F., as may be required, and then forced by a seven-foot fan through the various galvanized-iron ducts to the heat-flues, at the base of which are supplementary coils, which bring the temperature up to any degree desired. Dampers are placed at the base of each heat-duct, which are controlled by the nurse in each ward or room, and can be manipulated so as to give any temperature desired in any room or ward. The ventilation is extended to all the rooms throughout the building, including kitchen, bakery, laundry, toilet-rooms, and

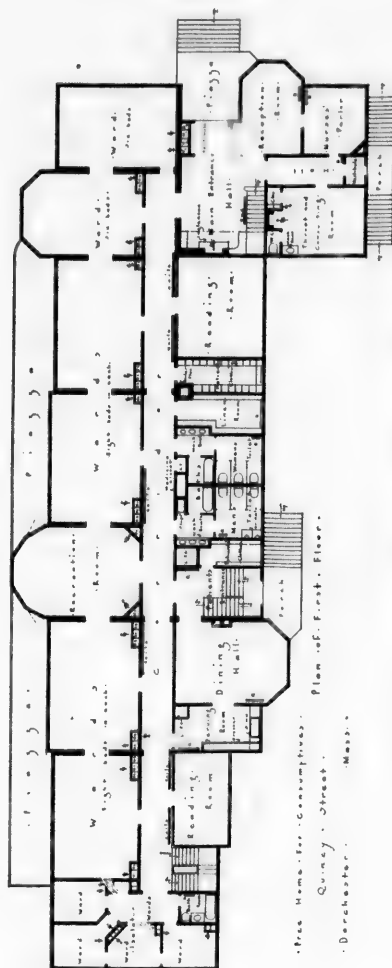


FIG. 56.—PLAN OF THE FREE HOME FOR CONSUMPTIVES IN THE CITY OF BOSTON.

also corridors. The air-supply is on a basis of seventy cubic feet per minute for each cot, and for each of four additional occupants.

The medical staff is composed of Drs. E. O. Otis, R. M. Merrick, and H. M. R. Watts as visiting physicians, and ten consulting physicians, with Dr. Frederick I. Knight as chairman.

THE WINYAH SANITARIUM.

This institution was founded a number of years ago by Dr. J. W. Gleitsmann, of New York, for the purpose of giving to the wealthier class of consumptives the benefit of the hygienic and dietetic treatment in a sanatorium, combined with the climatic advantages which North Carolina offers. This sanatorium, which I visited in 1897, is located at Asheville, and is now under the direction of Dr. Karl von Ruck. It consists of a large building with verandas, accommodating about one hundred patients. Very interesting to me was the well-equipped laboratory for bacteriological research attached to Dr. von Ruck's institution.

Since my visit to Asheville I learn that plans for a new and much larger institution have been decided upon. The new sanatorium will be located in a grove of oak and pines, twenty acres in extent, adjoining the city. The buildings are to consist of a main building with the necessary public rooms, baths, hydropathic-treatment rooms, and twenty-four private rooms for patients, together with several suits of rooms with private baths. The construction will be modern and in compliance with the most advanced principles of sanitary science, but with special reference to its occupation by phthysical patients. The heating will be with open fires in all public and private rooms, but steam-heat will also be supplied by indirect radiation, thus heating the outside air and delivering it into the different apartments. Abundance of sunlight is to be secured for all rooms, corridors, etc.

In addition there will be two cottages, one of four and another of seven rooms, which will be constructed and equipped the same as the main building. Additions to the capacity of the institution will be made by the erection of new cottages as the patronage may justify. Besides these, there will be a laboratory of six rooms, with perfect equipment for the study of tuberculosis.

No advanced or hopeless cases will be admitted.

THE ASHEVILLE SANATORIUM FOR DISEASES OF THE CHEST
AND THROAT.

On the summit of a large, wooded eminence known as "Oakland Heights," overlooking Asheville and one mile to the south of it, arises a second sanatorium, recently built in that city. It is under the medical management of S. Westrey Battle, M.D., U.S.N., and John W. Ross, M.D., U. S. N.

The view from the sanatorium is one of surprising loveliness—a panorama of city, rivers, valleys, forests, and distant mountains. The building is a substantial and ornamental structure, of three stories and basement, designed for sanatorium purposes, and contains eighty rooms. The appointments are modern, with elevator,



FIG. 57.—ASHEVILLE SANATORIUM.

electric lights, etc. The basement, which is on the level of the ground, is devoted to the bath establishment and gymnasium, including a swimming-pool. The house is provided above and below with numerous sunny, sheltered verandas and porches.

The capacity of the sanatorium is seventy-five patients.

The advantages of having all the patients under one extensive roof are obvious, the chief one being that they can be more easily and constantly watched over.

The grounds consist of fifteen acres of park land covered with an open growth of handsome oaks, interspersed with pines. The adjacent territory is especially suited for exercise on foot or horse-back, mountain-climbing, etc.

The sanatorium was opened on the 1st of March, 1898. The treatment in the sanatorium is, of course, the hygienic and dietetic, with all its various adjuncts (hydrotherapy, massage, etc.). The sanatorium is bountifully supplied with remarkably pure water for drinking and all other purposes, from its own spring, the large stream from which does not vary perceptibly in quality or quantity during wet or dry weather. In addition, the perfect system of sewerage will be flushed with water from the city water-works, and all sewage, after having been disinfected, will be discharged into the French Broad River, one mile away.

One of the medical directors resides permanently in the sanatorium.



FIG. 58.—MAIN BUILDING OF THE SANATORIUM HYGIEIA AT CITRONELLE.

THE HYGIEIA.

Two years ago there was founded at Citronelle, Ala., by Dr. A. C. Klebs, son of Professor Edwin Klebs, of Chicago, a sanatorium for consumptives. It is now under the management of Dr. J. G.

Michael, with Dr. Keith Fondé as house-physician, and has become an institution open all the year.

Citronelle is situated almost in the centre of the high pine-forest of South Alabama, sixty-two miles from the Gulf of Mexico, and thirty-three miles north of Mobile. It has an elevation of 360 feet above the level of Mobile Bay. It is the highest point, within this distance of the coast, between Boston and Galveston, and the highest point on the Mobile and Ohio Railroad between Mobile



FIG. 59.—COTTAGES OF THE SANATORIUM HYGEIA AT CITRONELLE.

and St. Louis. The elevation and the surrounding pine-covered hills give to Citronelle perfect drainage and pure water. The warm waters of the Gulf of Mexico modify the winter temperature, and the height at which the sanatorium is built protects it from too much moisture from the sea. It is also sufficiently removed from the neighborhood of malarial swamps.

The United States weather reports for each of the months of December, January, February, and March show that, at Citronelle, the minimum temperatures average fifteen degrees higher than at

Asheville, North Carolina. The average maximum for the same period shows seven degrees warmer here.

The "Hygeia" includes three large buildings and five cottages. The main building contains dining-room, parlors, reading-room, and business office, and a number of comfortable bedrooms for guests. In the fall of 1898 all the buildings were repainted inside and out; new bedding and furniture were placed in all sleeping-apartments; electric bells and modern sanitary appliances have been added. Most of the bedrooms are supplied with open fireplaces, thus insuring good ventilation and warmth.

For the entertainment of the guests and patients there are a billiard-room and bowling-alley; also beautiful grounds for croquet, lawn-tennis courts, and golf links. Besides this there are well-kept walks and roads, which give ample opportunity for beneficial exercise. There is, during the winter, excellent quail-shooting.

To judge from a recent announcement which Dr. Fondé kindly sent me, the "Hygeia" is as much a hotel as a sanatorium, and thus I do not think we can class it as a closed establishment in the strict sense of the word. The fact, however, that the institution consists of large pavilions should make a division and strict sanitary supervision easy. There are appliances for inhalation, massage, bath, and electricity. There is a special railroad-station immediately in front of the hotel.

"THE HOME" AT DENVER, COLORADO.

With a well-meant purpose, the Protestant Episcopal Church has created, near the beautiful city of Denver, a large institution for consumptives of the middle classes. It is called "The Home," and can be reached in fifteen minutes from the centre of Denver; three car-lines pass the institution. From the Home one has a commanding view over the entire city, the plains for hundreds of miles, and the Rockies for 150 miles, with an uninterrupted view of Pike's Peak, Grey's Peak, and Long's Peak.

The institution has a southern exposure, and comprises three buildings in colonial style: "St. Andrew's House" for men, "Grace House" for mother and son, or husband and wife, and the "Emily House" for women. These cover an entire block of land, and are connected by a glass and covered porch called the



FIG. 55.—"THE HOME" AT DENVER, COLORADO.

"Cloister." There are covered and uncovered porches front and back, up-stairs and down-stairs; a music-room; a library containing 2000 volumes; a gymnasium containing billiard-tables, chest-weights, Indian clubs, dumb-bells, etc. There are parlors in each of the buildings. In one hangs a very valuable oil picture, an old copy of one of the Holy Families, painted by Raphael. Bath-rooms, lavatories, and closets are in great abundance. There are accommodations for eighty people. Each room is separated from the adjoining rooms by a brick partition. The walls are hard finish and the floors are hard wood. There is a large, attractive dining-room.

The Rev. Frederick W. Oakes is the superintendent of the institution. It is calculated to be self-supporting. Patients pay one dollar per day and receive for this board and room. They have the right to choose their medical attendant.

When I visited this beautiful institution, my first disappointment was to learn that the Home had no house-physician. I passed through the corridors, library, and dining-room, and looked at the many cheerful and bright bedrooms. The air outside was brisk and clear, and the sun shone; but not one window was open, and the atmosphere inside of the institution was far too warm, and certainly not fresh enough to be of any benefit to the patients, who were nearly all indoors. While I have no doubt that every precaution is taken on the part of the management in regard to the sputum, to supervise constantly eighty-odd tuberculous patients and see that there should never be any violation of the sanitary rules and regulations of the house, requires more than the gentle hand of a minister or matron. Aside from this, it is my firm conviction that, in the interest of the patients, as well as in the interest of the community-at-large, there should never be so great a number of tuberculous invalids without the constant presence of a medical attendant. At no period in the course of the disease should the tuberculous patient be "kept"; he should always be treated. I make this criticism in the spirit of kindness, for I think it just as essential to describe existing defects as to emphasize the advantages which the various institutions I visited had to offer.

The beautiful photograph which I reproduce here will give a good idea of the institution, which is the result of the efforts of noble-minded men and women. Their aims cannot be praised too

highly, but if the institution would be transformed into a sanatorium, as understood by modern phthisio-therapeutists, the good which would be done would far exceed the work accomplished by the Home in its present state.

GLOCKNER SANITARIUM.

The Glockner Sanitarium is situated at Colorado Springs, Col. The climate of the region has been studied and described by Weber, Denison, and Solly. The latter says, in his comparative merits of American resorts, that "Colorado Springs, 6000 feet above the sea, has about the same winter temperature as Denver; is slightly drier; has less snow, but rather more wind. It was laid out as a health resort upon a mesa, near to, but sufficiently removed from, the shadow of Pike's Peak. It is a handsome residential town, without manufactories and with first-class resources of all kinds and beautiful suburbs."¹

Colorado Springs is situated on a vast plateau, and, though inclosed by the Rockies and foot-hills, it receives, nevertheless, its full share of insolation and is free from excessive heat and intense cold. The Glockner institution is situated at the northern end of the city and is easily accessible by electric cars in fifteen minutes.

From the circular the Sister Superior very kindly handed me, on my recent visit to the institution, I give the following extract, which describes the institution and its aims:

"The house was designed and built for the special care of pulmonary complaints, though it welcomes other invalids also. It is supplied with every modern convenience and appliance. It is so constructed that every room receives the sun. It is furnished, on every story, with ample porches, some entirely open, so as to receive all the influence of the air and sun; some covered, for exercise and air in inclement weather; some completely inclosed in glass, giving all the benefit of the sun, while sheltered from the air. An electric elevator reaches every floor. Electric lights are in every room and hall. Elegant sitting- and reading-rooms afford opportunity for social enjoyment. Spacious grounds and lawns relieve the eye and furnish pleasant walks. In order to facilitate life in the open air, so beneficial in pulmonary disorders, a number

¹ "Transactions of the Amer. Climat. Assoc.," vol. XIII, p. 181.

of tents have been erected on the grounds, in which patients may spend both day and night, if so disposed. It has been made a point to keep a table of the highest grade, in which the dishes are of a variety to suit every taste, and are prepared and served with the greatest care. The house is owned and managed by the Sisters of Charity."

This speaks for itself as to how far the institution is from a sanatorium—or closed establishment—in the meaning of the word as now interpreted. There is no house-physician, and the hygienic and sanitary supervision is in the hands of the Sisters of Charity.

THE BROOKLYN HOME FOR CONSUMPTIVES.

With an object similar to the institution just described, the Brooklyn Home for Consumptives was founded in 1881. It is, however, non-sectarian, and nearly all the churches of Brooklyn are contributors.

The "Home" is a large, comfortable building, situated at the corner of Butler and Douglass Streets, in the borough of Brooklyn. It can accommodate ninety-two patients. The institution is under the energetic management of Mrs. S. V. White, its president, with a number of ladies to aid her. The last annual announcement, which the matron-in-charge had the courtesy to give me when I visited the institution, speaks of a report of "allopathic physicians" and of a report of "homœopathic physicians." The former states that the number of—

Patients treated during the year was	152
Died during the year,	58
Left, improved,	22
Left with permission,	7
Left without permission,	3
Discharged,	3
Sent to hospital,	1
Remaining in Home,	58

The homœopathic physicians gave the following statement:

Patients treated during the year,	84
Died during the year,	27
Left, improved,	17
Left, unimproved,	6
Left without permission,	6
Sent to hospital,	1
Remaining in Home,	27

The institution is entirely free to the poor, and thus, no doubt, doing good work by accepting even the advanced cases. But the same criticism which I made in regard to the Denver Home is applicable to the Brooklyn Home. There is not a sufficient hygienic supervision, and no medical attendant resides in the house.

CANADA.

THE MUSKOKA COTTAGE SANATORIUM.

This institution, situated at Gravenhurst, Ont., was opened on the 1st of September, 1897. It is the first of a number of Canadian sanatoria which are to be erected by the National Sanatorium Association—an association founded by a number of philanthropists, and incorporated by special act of the Parliament of Canada, with an object "to establish public institutions for the isolation, treatment, and cure of persons affected with pulmonary disease."

The sanatorium is situated on the shores of Lake Muskoka, 125 miles north of Toronto, Ontario. All the buildings have their frontage to the south. The elevation is about 1000 feet. The air is bracing, dry, and free from dust. The region is very rocky, there being little farm land in the district. The formation is entirely Laurentian; the water is consequently free from lime, and is very soft. To the north and west are rocky bluffs, and, except on the south, the buildings are surrounded by a wood of beech, maple, and balsamic trees. To the south a terraced lawn stretches from the buildings to the shore of the lake. As the name indicates, the cottage plan of treatment has been adopted. In the administration building there are rooms for twenty patients. In it are also the offices, reception- and music-room, reading-room, broad, spacious hallways, kitchen, dining-room, and three solaria; one solarium faces the east; a second, southeast; the third, southwest. Along the front of the building is a broad piazza, on which the sun shines from morning until night, and above this, on the second floor, an open balcony of the same width.

None of the cottages accommodate more than six patients, some being limited to four. Each cottage has a large sitting-room, in which is an open fireplace. There is also a large piazza, so arranged that it may be partially inclosed with glass during the winter. All the buildings are lighted by electricity. The main



FIG. 61.—MUSKOKA COTTAGE SANATORIUM.

building is heated by steam, the cottages by hot water. During the cooler nights of early fall and late spring the fireplaces are used. Only fifty patients can be accommodated at present, but the number of cottages will be increased until there is room for about ninety patients.

There are no wards; each patient has a separate room. The rooms are large and well ventilated; each is so situated as to receive the sun during some part of the day. The interior of the building is finished in birch, with white walls above the wainscot. The floors throughout are of hard wood.

Artificial paths of various gradients have been made throughout the grounds. Although in such proximity to the water, the air is



FIG. 62.—A COTTAGE OF MUSKOKA COTTAGE SANATORIUM.

quite dry, and the patients can avail themselves of excellent boating facilities and daily excursions up the lakes for a few hours or the whole day.

The meals are at eight, one, and six, with lunches at eleven, four, and nine; all retire at ten.

The sanatorium is open throughout the year, the results in winter being fully as satisfactory as in summer. The nights in summer are quite cool. In winter there are no sudden changes in temperature. Snow lies on the ground from December until March, with steady frost. There is a maximum of sunshine. The patients are able to live on the verandas six to eight hours a day throughout the winter. The paths are kept clear of snow for walking.

Considerable driving is done during the sleighing season. Snow shoeing is also a favorite pastime and exercise for suitable cases.

The sanatorium is devoted to the treatment of pulmonary phthisis. The cost to each patient is six dollars per week, including medicine. The results for the first six months have been quite satisfactory, though much better figures would be given did the finances of the patients allow them to remain longer under treatment. Only patients will be admitted who are in an early stage of consumption, and to whom residence for a number of months in the sanatorium promises either a complete cure, or such an improved condition that they may be able to return to their homes to carry on their work. The sanatorium reserves the right to dismiss a patient at any time.

The physician-in-charge is Dr. J. H. Elliott; the examining physician for Toronto is Dr. N. A. Powell, and for Montreal, Dr. James Stewart.

THE LAURENTIAN SANATORIUM.

This Canadian establishment, with limited accommodation for twenty-five patients, is situated in a small valley formed by the chain of mountains bearing the name "Laurentian," at an elevation of nearly two thousand feet. It is partially exposed to the north, but principally to the southeast; in spite of this partial northern exposure it is sufficiently well protected by distant hills. The dry air in this region is particularly well adapted for the out-door life which the patients are enjoined constantly to follow. During the winter the typical Canadian cold weather does not offer any serious objections to the outdoor life of the patients; owing to the lack of moisture, the patients may be allowed to lounge in the open air for hours in perfect comfort, provided they are well wrapped up in woolen clothing.

This sanatorium is situated at about one mile from the village of St. Agathe des Monts, and at about an equal distance from the railway station. St. Agathe is sixty-four miles from Montreal, and is reached by a branch line of the Canadian Pacific Railway. This line was built some few years ago through a wild, mountainous district, and now one sees here and there small villages on each side of the railway. From the railway cars one is treated to natural scenes almost as grand as those to be seen in the Alps. From the summit of a small mountain rising behind the sanatorium one can

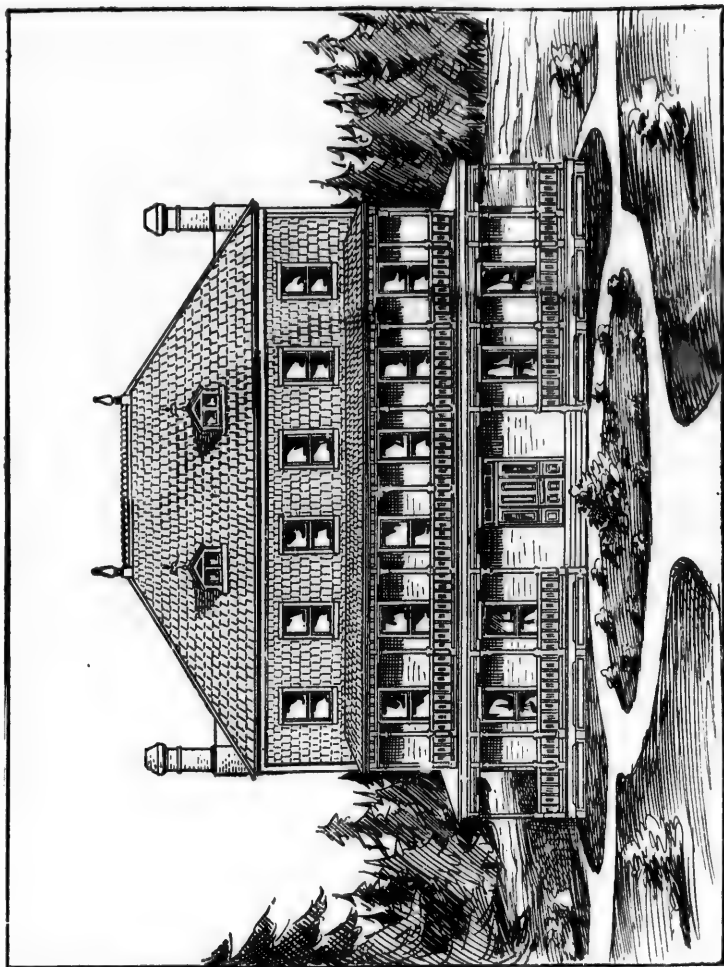


FIG. 63.—LAURENTIAN SANATORIUM.

count seven lakes, both large and small, in the almost immediate vicinity. The Laurentian Mountains are generally admitted as being the oldest mountain range in the world. It is in reality a sporting paradise, with innumerable lakes and forests, a great number of which are still unexplored.

The water for the sanatorium comes from a spring capable of supplying from twenty to thirty gallons per minute. Electricity is utilized for lighting the sanatorium. Two glass-enclosed verandas, each provided with fireplaces, add to the comfort of the patients, especially during the colder season. Drives and supervised walks offer a certain amount of diversion for the patients able to indulge in them.

Trained nurses are in constant attendance upon those patients who require their services. The nurses also have to keep a record of the pulse, temperature, and respiration, as well as note condition of the patients in their charge, for the control of the attending physician. Patients whose temperature does not exceed 99° F. are given a certain amount of freedom in a limited measure. Sun-boxes are here and there to be found, distributed over a large area of ground, where the patients can take an occasional rest during their walks.

This sanatorium, having been only recently built (1898), provides no luxuries whatever; but with time, improvements will be made for the comfort and well-being of the patients.

The sanatorium is under the direction of Dr. A. J. Richer, of Montreal. The admission of patients is made upon the recommendation of Dr. H. A. La Fleur, Associate Professor of Medicine at McGill College, Montreal. This gentleman is also consulting physician to the sanatorium. The therapeutical department is directed by Dr. Robert Wilson, Professor of Materia Medica and Therapeutics at Bishop's College, Montreal.



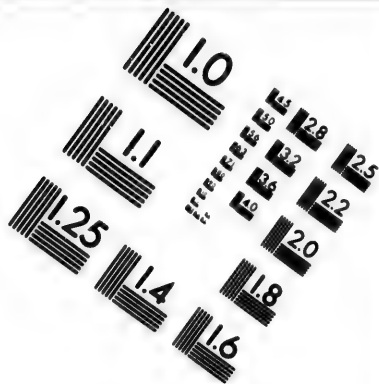
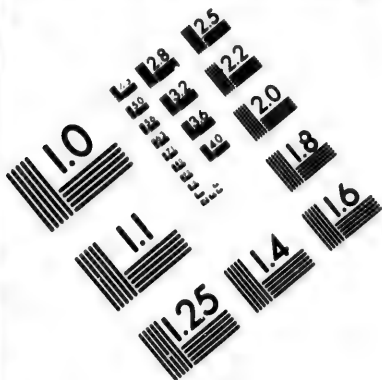
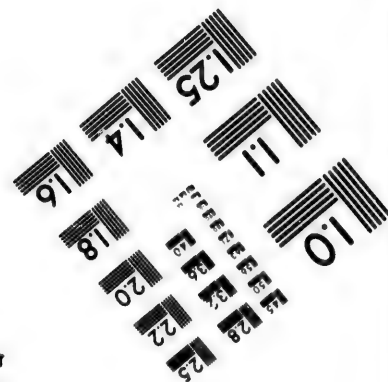
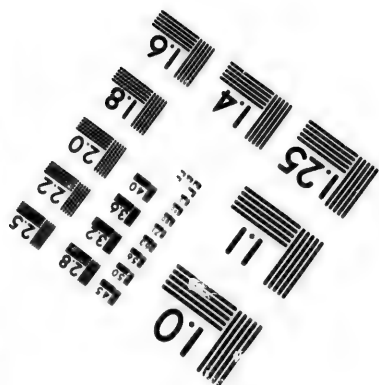
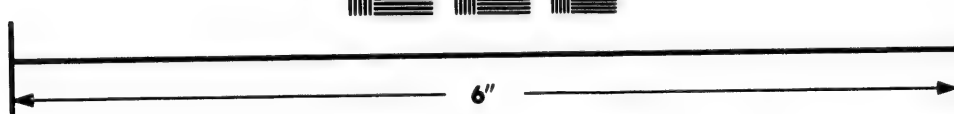
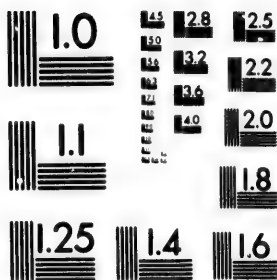


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CHAPTER IX.
LIST OF SANATORIA, SPECIAL HOSPITALS, HOMES, CAMPS, AND COLONIES
FOR TUBERCULOUS PATIENTS.

EUROPE.

NAME.	LOCATION.	COUNTRY.	PHYSICIANS.	ALTITUDE.	NUMBER OF BEDS.	REMARKS.
Heilanstalt Alland.	Near Vienna.	Austria.	Dr. Alex. Ritter von Weismayer and staff.	1300 feet.	300	Entirely free. Maintained by the Society for the Cure of Tuberculosis. Sanatorium under the patronage of the Emperor, and under direction of Prof. von Schrötter.
Sanatorium Neu Schnecks.	Neu Schnecks.	Hungary.	Dr. N. v. Szontagh.	3500 feet.		Full price. Not exclusively for tuberculous patients.
Sanatorium Budapesth.		Hungary.			300	Projected by, and under the auspices of, Prof. Korázyi, for the poor of the city of Budapesth.
Sanatorium Middelkerk.	Middelkerk.	Belgium.				Free. For scrofulous and tuberculous children.
Sanatorium Venduyn.	Venduyn.	Belgium.				Free. For scrofulous and tuberculous children.
Sanatorium Boserup.	Near Rolskilde.	Denmark.			60	Projected sanatorium for the city of Copenhagen.
Sanatorium Refsnas.	Refsnas.	Denmark.	Dr. Scheppelein.			For scrofulous children.
Sanatorium Fahlkegrav.	Near De Veit, Jutland.	Denmark.	Prof. Dr. Reisz.			One hundred thousand dollars have been collected for the erection of this institution. It will be partially free.

Sanatorium Vejle-fjords.	Vejle-fjords.	Denmark.			70	In course of construction. Has a State appropriation of 100,000 Kronen; will receive for this a number of patients free of charge.
Royal National Hospital for Consumption.	Ventnor, Isle of Wight.	England.	Four consulting, four visiting, two resident physicians.		134	Partially free. Founded 1868.
St. Catherine's Home for Patients in Advanced Consumption.	Ventnor, Isle of Wight.	England.	Two resident, six visiting, eight consulting medical officers.		12	Payment, \$3.00 per week.
Brompton Hospital.	London.	England.	Two house physicians.		321	Partially free. Established 1841.
Royal Hospital for Diseases of the Chest.	London, City Road.	England.	Three visiting, one house physician; one laryngologist.		80	Partially free. Established 1814.
North London Hospital for Consumption.	Mount Vernon (Hampstead).	England.	Two consulting, six visiting, one resident physician.		80	Price per week, \$2.50.
City of London Hospital for Diseases of the Chest.	London (Victoria Park).	England.	Two visiting physicians.		164	Established 1848. Partially free.
Consumptives' Home.	Torquay, (Mildway).	England.	One consulting, three visiting, one resident physician.		20	Established 1886. For advanced cases. Women only. Admittance with letter, \$1.75 per week; without, \$2.50 per week.
Bournemouth Hospital.	Bournemouth.	England.	Dr. John.		62	Established 1855. Price \$1.85 per week. No advanced cases received.
Sunny Mount Sanatorium.	Bournemouth.	England.	Dr. Pott.			Full price.
Dr. Pott's Sanatorium.	Bournemouth.	England.	Two medical officers.		8	Full price.
Bournemouth Firs Home.	Bournemouth.	England.			20	Established 1868. For advanced cases. Price, \$2.00 per week.
St. Joseph Convalescent Home.	Bournemouth.	England.			72	Open during the six winter months for adults and children. Admission by subscriber's letter and payment of \$3.00 per week.

LIST OF SANATORIA, SPECIAL HOSPITALS, HOMES, CAMPS, AND COLONIES FOR TUBERCULOUS PATIENTS.—(Continued.)

NAME.	LOCATION.	COUNTRY.	PHYSICIANS.	ALTITUDE.	NUMBER OF BEDS.	REMARKS.
Dr. Walker's Sanatorium.	Norfolk.	England.	Miss Walker, M.D.			Private. Full price.
Evesfield Hospital and Home for Consumption and Diseases of Throat and Chest.	St. Leonards.	England.	One resident, one visiting medical officer.			Established 1884. Full-price division and half-price division.
All Saints' Convalescent Home.	St. Leonards.	England.	Two visiting physicians.		17	Established 1876. Price, \$1.55 per week. Intended for women and for girls over twelve years of age.
Torquay Western Hospital.	Devonshire.	England.	Four visiting physicians.		40	Established 1850. Closed from June to September. Admission, with subscriber's letter, \$1.45; without, \$1.75 per week.
Worthing-Richmond Hospital and Home for Consumptives.	Richmond.	England.			24	Price from \$3.00 to \$3.60 per week.
St. Michael's and All Angels' Home for Consumptives.	Cheliden.	England.			40	Under charge of Sisters of Saint Michael. Most destitute cases taken in. Free.
Liverpool Hospital for Consumption and Diseases of Throat and Chest.	Mount Pleasant.	England.	One consulting, three visiting, one house physician.		44	Established 1864. Admission, with recommendation, \$0.63; without, \$1.75 per week.
Manchester Hospital for Consumption and Diseases of Throat and Chest.	Rowdon.	England.	Four consulting, six visiting, two house physicians.		50	Established 1875. Admission free, or whatever patients can afford to pay.
Northern Counties' Hospital for Consumption and Diseases of the Chest.	Northumberland.	England.	Three medical officers.			Admission by letter.
Royal Sea-bathing Infirmary for Scrofula.	Kent County.	England.			220	Founded in 1791. For the poor. Does not take pulmonary or laryngeal cases, but all other forms of tuberculosis.
Consumptives' Hospital for Scotland.	Bridge of Weir (Renfrewshire).	Scotland.			38	Opened in 1896.

Victoria Hospital for Consumption and Diseases of the Chest.	Craigleith.	Scotland.	One resident, two visiting medical officers.		15	Patients are selected at the out-patients' dispensary at Edinburgh. Restricted to cases with acute attacks or otherwise likely to be benefited. Free.
Newcastle National Hospital for Consumption.	Wicklow Hills.	Ireland.	Two visiting, one resident physician.		24	
Foster Green Hospital for Consumption and Diseases of the Chest.	Belfast.	Ireland.	One consulting, three visiting physicians.		40	
Sanatorium d'Hauteville.	Department Ain.	France.	Dr. Dumarest.			For the poor of the city of Lyons.
Sanatorium Canigon.	Canigon.	France.	Dr. Giresse.	2250 feet.	70	Full price.
Sanatorium du Château de Durtol.	Puy-de-Dôme.	France.	Dr. Ch. Sabourin.	1620 feet.		Full price.
Sanatorium d' la Touraine.	St. Radejonde near Tours.	France.	Dr. Chaumier.			Supported by the Society for the Cure of Tuberculous Children. (Boys.)
Hôpital de Villiers.	Sur Marne.	France.				Supported by the Society for the Cure of Tuberculous Children. (Girls.)
Hôpital St. Martin Lantosque.	Near Nice.	France.		3390 feet.		
Sanatorium Forges-les-Bains.		France.	Dr. Doumenge.			Free. For scrofulous and tuberculous children.
Hôpital d'Ormesen.	Ormesen.	France.	Dr. Léon Petit.			Free. For scrofulous and tuberculous children.
Public Maritime Hospital.	Berck-sur-Mer.	France.	Dr. Ménard and staff.			Free. For scrofulous and tuberculous children. For the poor of the city of Paris.
Hôpital Rothschild.	Berck-sur-Mer.	France.	Dr. Calot.			Free. For scrofulous and tuberculous children.
Sanatorium Villepinte.		France.				Free. For scrofulous and tuberculous children.
Sanatorium Arcachon.	Department Gironde.	France.	Dr. Lantueque.			Free. For scrofulous and tuberculous children.
Sanatorium Banyuls.		France.				Free. For scrofulous and tuberculous children.

LIST OF SANATORIA, SPECIAL HOSPITALS, HOMES, CAMPS, AND COLONIES FOR TUBERCULOUS PATIENTS.—(Continued.)

NAME	LOCATION	COUNTRY	PHYSICIANS	ALTITUDE	NUMBER OF BEDS	REMARKS
Sanatorium Pen-Bron.		France.				Free. For scrofulous and tuberculous children.
L'hôpital Boucicaut.	Paris.	France.	Dr. Letulle.			Separate pavilion for the consumptive poor of Paris.
Sanatorium Ville la Pierre.	St. Symphorien.	France.	Dr. Chaumier.			Full price.
Sanatorium Augicourt.		France.			126	In construction.
Sanatorium Magny.		France.				In construction.
Sanatorium Trespoey.	Near Pau.	France.	Dr. Crouzet.			
Sanatorium Tixerain.	Birmandreix near Algers.	France.	Dr. Soulier.			
Asile Israélite.	Nice.	France.	Dr. Bar.		20	For the poor.
Heilanstalt Falkenstein.	In Taunus.	Germany.	Drs. Dettweiler and Hess.	1375 feet.	150	Full price.
Krankenheim Goerbersdorf.	In Silesia.	Germany.	Dr. Weicker and Drs. Knoblauch and Schön.	1840 feet.	160	Price, \$7.00 per week. Only for incipient cases.
Heilanstalt der Gräfin Pueck- ler.	Goerbersdorf.	Germany.	Dr. Weicker.	1840 feet.	30	Nine dollars per week.
Sanatorium Brehmer.	Goerbersdorf.	Germany.	Prof. Dr. R. Kobert and assistants.	1840 feet.	250	Full price.
Roempler's Heilanstalt.	Goerbersdorf.	Germany.	Dr. Roempler.	1840 feet.	100	Full price.
Driver'sche Heilanstalt.	Reiboldsgrün.	Germany.	Dr. Felix Wolff.	2460 feet.	100	Full price.
Heilanstalt Bad Laubach.	Near Coblenz on the Rhine.	Germany.	Dr. Wm. Achter- mann.		75	Full price and a division at reduced prices.
Sanatorium Hohenbounef.	On the Rhine.	Germany.	Dr. E. Meisen.	735 feet.	100	Full price.

Heilstätte für unbemittelte Kranke.	Ruppertsheim.	Germany.	Dr. N. h. m. Spiegel, assistant.	1200 feet.	100	Patients pay a part of the expense (\$0.75 per day).
Sanatorium Rehburg.	Harz Mountains.	Germany.	Dr. Leherche.	650 feet.	30	Full price.
Sanatorium Schönborg.	In the Schwarzwald.	Germany.	Dr. Koch.	2050 feet.		Full price.
Sanatorium Haufe.	St. Blasien.	Germany.	Dr. Sander.	2500 feet.	60	Full price.
Sanatorium Badenweiler.	Schwarzwald.	Germany.	Dr. Leiser.	1380 feet.		Full price.
Sanatorium Nordrach.	Schwarzwald.	Germany.	Dr. Walther.	1500 feet.	40	Full price.
Sanatorium Michaelis.	Rehburg i. Harz.	Germany.	Dr. Michaelis.	500 feet.	20	Full price.
Dr. Friedmann's Sanatorium.	Blankenhau in Thüringen.	Germany.	Dr. Silberstein.		15	Full price.
Sanatorium Oberweiler.	Gr. Mühlheim in Baden.	Germany.	Dr. A. Vogel.			Full price.
Sanatorium St. Andreasberg.	In the Harz Mountains.	Germany.	Dr. Jacobasch.	1900 feet.		Full price. Not entirely a closed establishment.
Sanatorium Schönborg.	In the Schwarzwald.	Germany.	Dr. Koch.	2050 feet.	20	For the poorer classes.
Sanatorium Harlachung.	Near Munich.	Germany.	Prof. Dr. von Ziemssen.		200	For the poor of the city of Munich.
Sanatorium Hasselfelde.	Harz Mountains.	Germany.				In course of construction by the State Insurance Department.
Heilanstalt Altenbeck.	Harz Mountains.	Germany.	Dr. Pinchovius.	1115 feet.	30	For the poorer classes.
Sanatorium Albertsberg.	Near Auerbach, Saxony.	Germany.	Dr. Gebser.		122	For the poorer classes.
Sanatorium Oderberg.	Harz Mountains.	Germany.	Dr. Ott.	2000 feet.	110	Erected by the Hanseatic Insurance Company against Old Age, Sickness, etc. (For men.)
Sanatorium Königsberg.	Near Goslar.	Germany.	Dr. Andrae.			Erected by the Insurance Company against Old Age, Sickness, etc., of Hannover. (For men.)

LIST OF SANATORIA, SPECIAL HOSPITALS, HOMES, CAMPS, AND COLONIES FOR TUBERCULOUS PATIENTS.—(Continued.)

NAME.	LOCATION.	COUNTRY.	PHYSICIANS.	ALTITUDE.	NUMBER OF BEDS.	REMARKS.
Sanatorium Prinzentanne.	Zellerfeld.	Germany.				Erected by the Insurance Company against Old Age, Sickness, etc., of Hannover. (For women.)
Sanatorium Daunenfels.	In Baden.	Germany.			18	Maintained by the soda factory of Ludwigshafen for its consumptive laborers.
Sanatorium Worms.		Germany.				For the poor.
Sanatorium Rehburg.	Harz Mountains.	Germany.	Dr. Thorspecken.			For the poor of the city of Bremen.
Sanatorium Malchow.	Near Berlin.	Germany.			87	For the poor of the city of Berlin. Patients pay about \$0.75 per day. (For men.)
Sanatorium Blankenfelde.	Near Berlin.	Germany.			63	For the poor of the city of Berlin. Patients pay about \$0.75 per day. (For women.)
Heilanstalt am Grabowsee.	Near Oranienburg.	Germany.	Drs. Gerhard, Pannwitz, and Brecke.		160	Seventy-five cents per day. For early cases only. The cottages of the Red Cross Society are used.
München's Vereins-Sanatorium.	Near Planegg.	Germany.	Dr. May.		70	For the poor.
Loslau Sanatorium.	Silesia.	Germany.	Dr. Liebe.		110	For the poor of the city of Oppeln.
Sanatorium Altena.	Lüdenscheid.	Germany.	Dr. Staufer.			Opened August 1, 1898.
Sanatorium Lippspringe.	Westphalia.	Germany.				For the poor of the city of Barmen.
Sanatorium Felsstift.	Oderberg.	Germany.				For the poorer classes.
Sanatorium Albrechtsheim.	Brunswick.	Germany.				Erected by the State Insurance Company against Sickness, Old Age, etc., for Brunswick. (Men.)
Sanatorium Marienhein.	Albrechtsheim.	Germany.				Erected by the State Insurance Company against Sickness, Old Age, etc., for Brunswick. (Women.)
Sanatorium Sulzhayn.	Near Elrich (Harz Mountains).	Germany.	Dr. Kremser.	1250 feet.	120	Founded by the Miners' Associations of Northern Germany.
Sanatorium Kremser.	Near Elrich (Harz Mountains).	Germany.	Dr. Kremser.			Full price.

Sanatorium Arlen.	In Baden.	Germany.			40	Founded by Mr. Ten Brinck for his workmen.
Sanatorium Marzell.	In Baden.	Germany.				Erected by the State Insurance Company of Baden.
Sanatorium Haag.		Holland.				Free. For scrofulous and tuberculous children.
Sanatorium Hollandais.	Davos (Switzerland).	Holland.	Dr. Schnoeller.		33	For the poorer classes.
Institut Rachitici.	Milan.	Italy.				Free. For scrofulous and tuberculous children.
Sanatorium Tonsaasen.	Tonsaasen.	Norway.	Dr. Andvord and J. Soemme.	1850 feet.	90	Full price.
Sanatorium Reinaes.	Near Molde.	Norway.	Dr. E. Kaurim.		100	Free for the poor. Those able to pay, \$0.32 per day.
Sanatorium de l'Hôpital St. Georges.		Norway.		1560 feet.	100	Free for the poor.
Seaside Hospital.	Near Fredriksvaern.	Norway.			60	For scrofulous children.
Seaside Hospital.	Hagevik.	Norway.			40	For scrofulous children, \$0.15 per day.
Sanatorium Lindenhof.	Finland.	Russia.	Dr. Treu.			For the poor.
Obouchowsky Hospital.	St. Petersburg.	Russia.				For the poor.
Alexander Hospital.	St. Petersburg.	Russia.				For the poor.
Alexandrina Hospital.	St. Petersburg.	Russia.				For the poor.
Sanatorium Maria Alexandrowa.	Taitzi (Baltic Prov.).	Russia.			40	Gift of the Emperor.
Sanatorium Halila.	Finland.	Russia.	Dr. Gabrieliowitch.		76	For the poor.
Sanatorium Odessa.		Russia.				For the poor.
Sanatorium Oranienbaum.	Near Peterhof.	Russia.				For the poor.
Sanatorium Slavata.	In Volhynia.	Russia.				For the poor.

LIST OF SANATORIA, SPECIAL HOSPITALS, HOMES, CAMPS, AND COLONIES FOR TUBERCULOUS PATIENTS.—(Continued.)

NAME.	LOCATION.	COUNTRY.	PHYSICIANS.	ALTITUDE.	NUMBER OF BEDS.	REMARKS.
Sanatorium Valtà.	Crinea.	Russia.			80	For the poor.
House Sanatorium of the Military Hospital.	Zarskoye Selo near St. Petersburg.	Russia.	Dr. Unterberger.			For soldiers only.
Hospital de Woia.	Near Warsaw.	Poland.				
Sanatorium Turban.	Davos.	Switzerland.	Dr. Turban.	5115 feet.	75	Full price.
Sanatorium Arosa.		Switzerland.	Dr. Jacobi.	6150 feet.	65	Full price.
Nene Heilanstalt.	Davos.	Switzerland.	Dr. Daunegger.	5115 feet.		Full price.
Sanatorium Leysin.	Canton de Vaud.	Switzerland.	Dr. Eschaguet.	4750 feet.	130	Full price.
Sanatorium Heiligen-Schwendli.		Switzerland.		4650 feet.	50	For the poor of the city of Bern.
Sanatorium Basel.	Near Basel.	Switzerland.		950 feet.	70	For the poor.
Sanatorium Davos Dörfli.		Switzerland.	Dr. Kuendig.	5100 feet.	80	For the poor of the city of Basel.
Sanatorium Braunwald.		Switzerland.	Dr. Fritsche.	3700 feet.	30	For the poor of the city of Glarus.

UNITED STATES.

Hygeia.	Citronelle.	Alabama.	Dr. Keith Fondé.	350 feet.		Full price.
Convict Camp.		Alabama.				For tuberculous prisoners of the State.
The Home.	Denver.	Colorado.	No house physician.	4500 feet.		Intend— to be self-supporting, but subscriptions needed. Superintendent, Rev. F. A. Oakes.
Glockner Sanitarium.	Colorado Springs.	Colorado.		6000 feet.		In charge of the Sisters of Charity. Prices vary.
The Colorado Sanatorium.	Boulder.	Colorado.	Dr. W. H. Riley.	5500 feet.		Not exclusively for lung diseases.

Chicago Sanitarium for Tuberculosis.	Chicago.	Illinois.	Secretary, Dr. J. A. Robison.			Projected. Society incorporated in 1886.
Cook County Hospital for Consumptives.	Dunning	Illinois.			380	For the tuberculous poor of Cook County.
Hospital for Consumption.	Baltimore.	Maryland.				For the poor.
Sharon Sanitarium for Pulmonary Diseases.	Sharon.	Massachusetts.	Dr. V. V. Bowditch.	400 feet.	15	Board, \$5.00 per week, exclusive of washing. Medical service and medicine free.
Consumptives' Home.	Roxbury.	Massachusetts.				For the poor.
Free Home for Consumptives.	Dorchester.	Massachusetts.	Dr. E. O. Otis and staff.		125	For the poor of the city of Boston.
Massachusetts State Hospital for Consumptives.	Rutland, Worcester County.	Massachusetts.	Dr. W. J. Markey.		200	The uniform price is \$0.50 per day.
Sanatorium, Chico Springs.		New Mexico.				The ranch of ex-Senator Dorsey is to be converted into a large sanatorium for consumptives.
Latta Sanatorium.	East Las Vegas.	New Mexico.			15	Small institution under charge of Sisters Latta. (Protestant) Trained nurses. Full price.
Ladies' Home Sanatorium.	East Las Vegas.	New Mexico.	Visiting physician, Dr. Atkins.		16	Supported by the Ladies' Local Relief Society. Free for those able to pay, \$5.00 to \$8.00 per week.
St. Anthony's Sanatorium.	Near East Las Vegas.	New Mexico.				Under charge of Roman Catholic Sisters; \$6.00 to \$12.00 per week.
Adirondack Cottage Sanatorium.	Saranac Lake.	New York.	Dr. Trudeau.	1750 feet.	100	Price, \$5.00 per week. The deficit of \$2.00 made up by public subscription.
Loomis Sanitarium for Consumptives.	Liberty.	New York.	Dr. Stubbett.	2200 feet.	80	Cottage plan. Private rooms, \$7.00 to \$10.00 per week; in double rooms, \$5.00 per week. As a rule, only early cases admitted.
Loomis' Hospital for Consumptives.	New York City.	New York.	Dr. Quimby, visiting physician.		12	Entirely free.

LIST OF SANATORIA, SPECIAL HOSPITALS, HOMES, CAMPS, AND COLONIES FOR TUBERCULOUS PATIENTS.—(Continued.)

NAME.	LOCATION.	STATE.	PHYSICIANS.	ALTITUDE.	NUMBER OF BEDS.	REMARKS.
Seaton Hospital for Consumptives.	Spyuten Duyvil.	New York.	Dr. Jackson and Shady, visiting physicians; Dr. Paffard, house physician.	250 feet.	160	The New York Board of Health sends there its consumptive poor and pays \$1.00 per person daily. Others pay \$5.00 per week.
Sanatorium Gabriels.	Paul Smith's.	New York.	Dr. Noble.		50	Cottage plan. In charge of Sisters of Mercy. Only incurable tubercular patients taken. Seven dollars to \$12.00 per week.
Hill Crest.	Santa Clara, Franklin County.	New York.	Dr. Jennie M. Richardson.	1700 feet.		For incipient cases only. Seven dollars per week. Maintained by the Working Girls' Vacation Society of New York.
Brooklyn Home for Consumptives.	Brooklyn.	New York.	No house physician, three visiting regular, three visiting homoeopathic physicians.		92	Entirely free. Male, female, and children's wards.
St. Joseph Hospital.	New York City.	New York.	Physician-in-Chief, Dr. Cauldwell.		350	For the poor.
Montefiore Country Sanitarium.	Bedford.	New York.	Dr. Hebert.	400 feet.	15	Entirely free.
Pasteur Sanatorium.	Tuxedo.	New York.	Dr. Gibier.	900 feet.	30	Full price, but a number of free beds are reserved for consumptive physicians.
Winyah Sanitarium.	Asheville.	North Carolina.	Dr. Karl von Ruck.	2350 feet.		Full price.
Asheville Sanitarium.	Asheville.	North Carolina.	Dr. S. W. Battle.	2350 feet.	75	Full price.
Hospital for Diseases of the Lungs.	Chestnut Hill.	Pennsylvania.	Dr. Bacon.		40	Protestant Episcopal. For the poor. (For women.)
Hospital for Diseases of the Lungs.	411 Spruce Street, Philadelphia.	Pennsylvania.				Protestant Episcopal. For the poor. (For men.)
Rush Hospital for Consumptives.	Philadelphia.	Pennsylvania.	Medical staff of four visiting and several consulting physicians.		40	Free.

White Gables; S. W. Texas Sanitarium.	Boerne, Kendall County.	Texas.	Dr. Miller and staff of eight physicians.	1430 feet.	Especially equipped for diseases of throat and lungs, but other cases admitted full price.
Pennsylvania Sanatorium.	White Haven.	Pennsylvania.			Projected by the Society for the Prevention of Tuberculosis.
Chicago Hospital for Consumption.	Chicago.	Illinois.			Projected. Endowed by Mr. Otto Young.
United States Government Sanatorium.	Fort Stanton (Lincoln County).	New Mexico.	United States Marine Hospital Service. J. C. Cobb, Post Assistant Surgeon.		Projected upon recommendation of Surgeon-General Wyman by the United States Government for the treatment of tuberculous Marine-Hospital patients.

CANADA.

Muskoka Cottage Sanatorium.	Gravenhurst.	Ontario, Canada.	Dr. J. H. Elliott.	50	Patients pay \$6.00 per week.
Laurentian Sanatorium.	St. Agathe des Monts.	Ontario, Canada.	Dr. A. J. Richer.	25	Full price.

AUSTRALIA AND ASIA.

Sanatorium Dalby and Sanatorium Roma.	Queensland.	Australia.			An additional small hospital is to be built. Twenty-five thousand dollars have been appropriated for this purpose by the Home Secretary.
Imperial Hospital for the Study of Consumption.	Tokio.	Japan.	Prof. Kitasato.		

CHAPTER X.

CLIMATO-THERAPY IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

Among the methods of curing pulmonary tuberculosis I wish to consider, first, the treatment in sanatoria,¹ or, as the Germans call it, the hygienic and dietetic treatment in closed establishments, because I think it the most important of all. I have convinced myself, by actual experience as an assistant in an important institution of this kind, and by visiting in person nearly all the principal sanatoria for consumptives in Europe and the United States, that the tuberculous patient has the best chances of getting well only when he is under constant medical supervision. My observations in this direction have been confirmed by comparing the results of treatment in so-called health resorts and in private practice under ordinary conditions with those of the sanatorium treatment. These results, equally good in whatever country the institution exists, are the best plea for their universal establishment.

But before entering into the subject of the treatment proper, we must review the subject of climato-therapy and arrive, if possible, at some conclusions as to the value of this or that region in the treatment of tuberculous invalids.

There is hardly any subject on which more has been written than on the climato-therapy of pulmonary tuberculosis. There is still a vast diversity of opinion as to the respective merits of what are still sometimes called specific climates for consumptives; but the number of phthisio-therapeutists who consider even the best and most suitable climate of secondary importance, and the hygienic and dietetic treatment, preferably in a closed establish-

¹ Contrary to the custom of many English-speaking people, especially in the United States, I call these establishments *Sanatoria*, and not *Sanitaria*. The former (sanatorium), from *sanare*, to heal, gives a better equivalent to the German "Heilanstalt," the word used by the originator of this system (Brehmer). Secondly, the word "sanitarium," from *samitas*, health, is usually employed to designate a place considered simply as especially healthy—a favorite resort for convalescent patients.

ment, or under constant medical supervision in congenial surroundings, the all-important factor, is constantly increasing. I do not deny the beneficial influence of certain climatic conditions on the various forms of phthisis; but, with all deference to the opinion of others, I do not believe that there exists any climate with a specific curative quality for any form of pulmonary tuberculosis. Climate can only be considered a more or less valuable adjuvant in the treatment of consumption, but not a specific. A tuberculous patient of the irritable pyrexial type, with much tendency to nasal and bronchial catarrhs, will often do better in a warm climate with little elevation, such as Southern California, Southern Arizona, New Mexico, Western Texas, Florida, etc., in the United States; Jersey and Sidmouth in England; Pau and Hyères in France; San Remo in Italy, etc.

To higher altitudes, such, for example, as Davos and St. Moritz-dorf in Switzerland, or the mountains of Colorado, Montana, Utah, and Wyoming in the United States, may safely be sent early cases with no throat complications, persons with a chest badly developed either by transmission of a phthisical predisposition or fault of development, and all ordinary cases of phthisis. They are most likely to be benefited in such climates. Weber's classification seems to be the most correct. In his Croonian lectures (1885) he classes the following cases as those for which higher altitudes are unsuitable: (1) Consumptive persons belonging to the erethic type, whether the affection is early or advanced; (2) phthisis in a very advanced stage; (3) phthisis complicated with extensive emphysema; (4) phthisis complicated with albuminuria; (5) phthisis complicated with disease of the heart; (6) phthisis with ulceration of the larynx; (7) phthisis with rapid progress and constant pyrexia; (8) phthisis with great loss of substance; (9) phthisis with considerable empyema; (10) phthisis in persons who cannot sleep or eat in high elevations, or who feel constantly cold.

As an intermediate altitude of between two and three thousand feet, Fletcher Ingals recommends some portions of Dakota, Nebraska, Minnesota, the Adirondack Mountains, and those of Virginia, North Carolina, and Tennessee, to which I would wish to add the region about Liberty in Sullivan County, N. Y., as especially suitable for phthisical patients in summer. As typical winter climates he mentions Arizona, Southern California (among the foot-hills as far as possible from the ocean), Southern New Mexico, South Carolina, Georgia, and Texas.

Climatic
idiosyn-
crasies.

Besides this selection of climates to suit the respective forms of pulmonary phthisis, there are to be considered what I would like to call climatic idiosyncrasies among tuberculous patients. Of two patients with seemingly the same temperament and at about the same stage of the disease, one feels best and makes most rapid road to recovery in one of the Mediterranean places or Southern California; while the other, who had also been sent to such places, apparently would have died had he not left there in time and gone to Davos or Colorado, or some other resort of high altitude. I know of patients who got well at the Adirondacks and felt badly at Liberty, and vice versa; both places are in the State of New York, and their climatic conditions differ very little. Some patients do well in island and coast climates; others improve greatly on a sea-voyage. While it may be safely said that in the majority of cases any climatic change will do good, too much travel should be discouraged. To send a patient away from home in the advanced stage of phthisis has always seemed to me cruel and useless, it nearly always hastens a fatal termination, which is the sadder since it takes place among strangers and away from home. Those desiring to benefit by climatic changes should travel to warmer climates in fall and to colder ones in spring; thus the acclimatization of the consumptive individual will be more easily accomplished.

Choice
between
warmer
and colder
climates.

As to the choice of a warmer or colder clime for a cure, Fletcher Ingals¹ may be right in saying that patients who feel better in cold weather should be sent to a comparatively cold climate; those feeling better in summer, to warmer regions. But, in spite of excellent works in phthisio-climato-therapy, such as Weber's,² de la Harpe's,³ and Solly's,⁴ our present knowledge of the subject is still limited, and opinions as to the best method of classifying climates as to their respective merits in phthisio-therapy differ vastly. If I should be asked to express an opinion on the subject, I would say the best climate for a consumptive is the one where the aërotherapeutic portion of the hygienic and dietetic treatment, as understood to-day by the modern phthisio-therapeutists, can be carried out most easily and most persistently; or, in other words, the best cli-

¹ Ingals, "Diseases of the Chest, Throat, and Nasal Cavities."

² Weber, Hermann, "Climotherapie."

³ De la Harpe, "Formulaire des Stations d'Hiver et des Stations d'Été."

⁴ Solly, "Medical Climatology."

mate for a consumptive is the one which permits him to remain out-doors more and longer at a time than anywhere else. But since an ideal climate cannot be obtained everywhere and will not be within the reach of everybody, the best thing to do is to get as near these conditions as possible, and preferably at not too great a distance from home. Places where pure, dry atmosphere and some elevation, with protection from winds, can be had, abound more or less in all countries.

I cannot conclude this short review on climato-therapy in re- ^{Results in} gard to pulmonary tuberculosis without mentioning a most im- ^{"home} portant fact which has been very little regarded up to this date ^{climates."} in our text-books on climatology. I refer to the relative durability of cures obtained in different climes. I know from personal observation of quite a number of cases that cures of pulmonary tuberculosis effected in our home climates, which are, in the average, not considered as especially favorable to this class of sufferers, have been more lasting and more assured than cures obtained in more genial climes away from home. In these observations I do not stand alone, for such men as v. Leyden, Gerhardt, v. Ziemssen, Dettweiler, Naunyn, Fränkel, and Walthers¹ have had the same experience. Of what vast importance these facts are in relation to the social problem of tuberculosis and the treatment of the tuberculous poor, we will see in chapter xxv, where these subjects will be dealt with more at length.

¹ "The Practitioner," Tuberculosis number, London, 1898, p. 670.

CHAPTER XI.

DESCRIPTION OF AN IDEAL SANATORIUM FOR THE TREATMENT OF TUBERCULOUS PATIENTS.

What locality should be chosen for the establishment of a sanatorium where all classes of consumptives should be received, benefited, and the largest possible number cured? Thoroughly disbelieving in the specific curative quality of any climate, I should place a sanatorium where it can do the most good to the largest number. When we consider the vastly important social and economical questions which the modern phthisio-therapist must take into consideration, I cannot help declaring my firm belief that it is essential to the majority of tuberculous patients to be treated and cured in the same or nearly the same climate where they will have to live and work after their restoration to health.

Location.

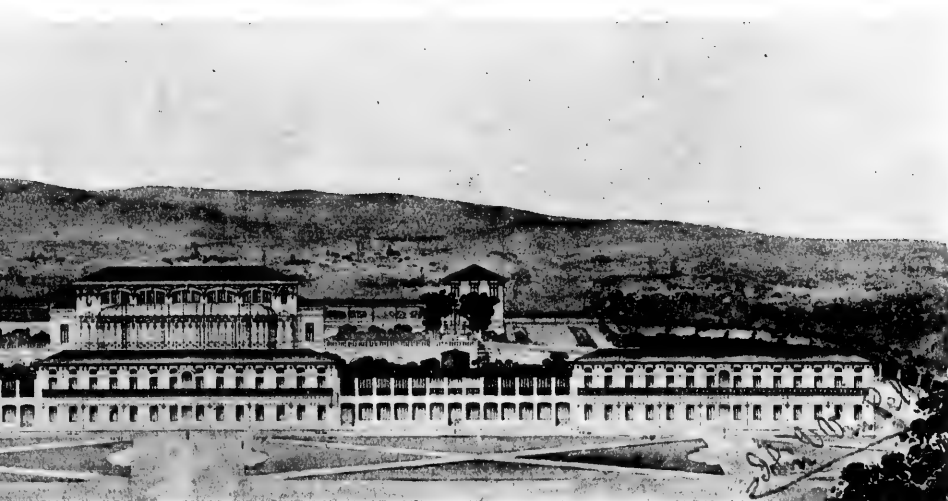
I would, therefore, place the sanatorium for consumptives within easy reach of a large centre of population, at no greater distance than from three to five hours by rail. It should be in a region known for its relative purity of atmosphere, where there is freedom from all miasmatic and malarial influences, and where the pathogenic microbes are only found in negligible quantities. If possible, it should be where the extremes of temperature are not too pronounced, and, if the region is a mountainous one, at an altitude of from one thousand to fifteen hundred feet. The site should be a pleasant one, with a southern exposure and protected from cold winds by higher mountains or woodlands (pine-woods should be given the preference). The ground, of course, should be dry and porous. But that all these conditions are not necessary has been proved in institutions which have neither the advantages of a favorable climate nor a high altitude. There exists in Scotland an establishment devoted to the treatment of consumption, known as the "Victoria Hospital of Edinburgh" (at Craigleith). When I visited it, in September, 1894, it had only just opened, and up to the 31st of May, 1895, sixty-five patients had been already under treatment,

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FIG 64.—PERSPECTIVE VIEW OF AN IDEAL SANATORIUM



VIEW OF AN IDEAL SANATORIUM FOR CONSUMPTIVES.—LARGE PAVILION SYSTEM.

with satisfactory results.¹ What is possible in Scotland with its rigorous climate is possible anywhere else. In the United States I know of two institutions located but a few miles from two of the largest cities, and the results obtained are certainly most remarkable, for there are no special climatic advantages claimed for either of them. Both locations are exposed to the extreme heat as well as to the severe cold so frequently experienced in the Eastern cities of the United States. I refer to Sharon Sanatorium, near Boston, and the Chestnut Hill Hospital for Consumptives, near Philadelphia.

If I had to choose between sending a patient to what is usually considered an ideal specific climate, but where he would live as in an ordinary health resort, or keeping the patient home in a fairly pure atmosphere and applying the hygienic and dietetic treatment under constant medical supervision, I should choose the latter method of treatment, and think the patient had a far better chance of recovery.

In a very elaborate work Blumenfeld² has given the results of his daily observations, throughout the year, of the influence of the various meteorological changes exerted on the condition of a large number of phthisical patients. His conclusions prove, what Dettweiler has been preaching for the last twenty years, that temperature, atmospheric pressure, and humidity scarcely influence the condition of the consumptive. The only really dangerous thing such patients need to guard against is strong, penetrating wind. Dr. H. Weber³ expressed himself, at the Tenth International Medical Congress, in the following terms: "Die Behandlung der Schwindsucht ist überall möglich wo für reine Luft, passende Nahrung und mässig graduirte Bewegung gesorgt werden kann." (The treatment of consumption is possible wherever there is pure air, wherever appropriate food can be procured, and wherever moderate graduated exercises can be instituted.) Von Leyden, Kretschmar, Dujardin-Beaumetz, Cantani, and other members of the congress expressed themselves in a similar way.

¹ Philip, R. W., "The Victoria Hospital for Consumption, Edinburgh: Its Rise and Outlook." "Edinb. Hosp. Reports," 1895.

² Blumenfeld, "Über den Einfluss meteorologischer Vorgänge auf den Verlauf der bacillären Lungenschwindsucht."

³ "Verhandlungen des X. Internat. Congresses," Bd. II, Abtheilung 5.

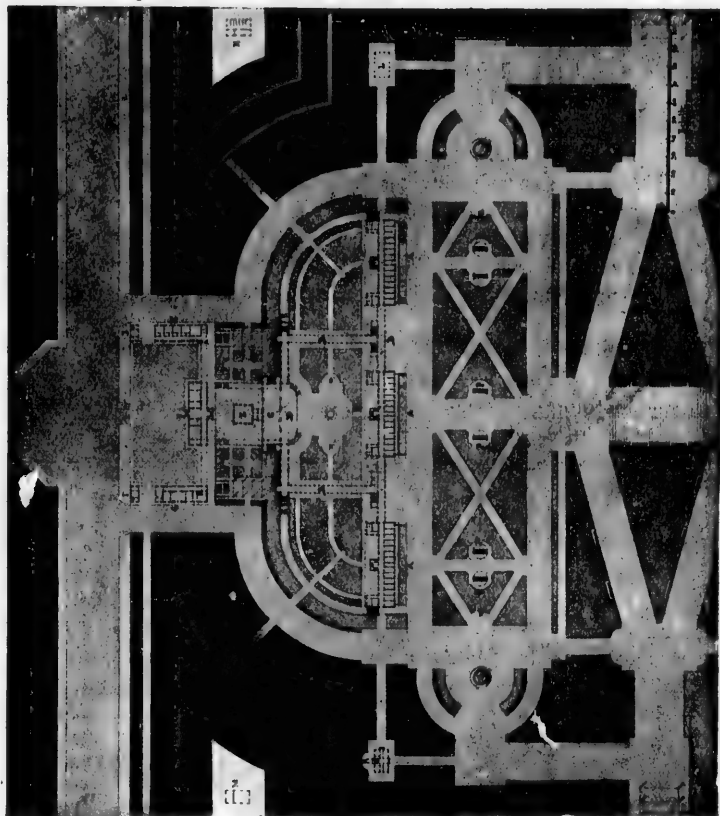


FIG. 65.—PLAN OF THE IDEAL SANATORIUM.
 A. Pavilion for patients. B. Galleries uniting the pavilions. C. Dining-hall. D. Winter-garden. E. Kitchen.
 F. Administration building. G. Physician's house. H. House for visitors. I. Janitor and gardener. K. House
 for isolation. L. Recreation pavilion. M. Disinfecting-room. N. Stables. O. Turning pavilions.

The next question to be considered would be the choice of buildings and their mode of construction. Which plan would it be best to adopt—the European system, in which they house as many as seventy-five to one hundred patients under one roof, or the American cottage-system, with no more than from four to eight in each cottage? To make so large an aggregation as one finds in some of the European institutions seems certainly not a good plan, since the hygienic measures are almost sure to suffer in such a house. On the other hand, the cottage system, while it may be the ideal for some diseases, is, on the whole, not the most desirable for a sanatorium for consumptives. The constant medical supervision—one of the most important features in the sanatorium treatment—can hardly be carried out in a village of twenty or thirty small cottages several hundred feet apart, not to mention the increased expense such a system involves.

In visiting the numerous institutions I endeavored, by taking comparative notes, to form a plan of what would seem an ideal sanatorium for the treatment of tuberculous patients in all stages, and under varied climatic conditions, and adaptable to nearly all localities. I conveyed my ideas to my friend, Mr. John Van Pelt, formerly of the "École des Beaux Arts" of Paris, now Assistant Professor of Architecture at Cornell University in Ithaca, N. Y., with instructions to draw the plans necessary to illustrate my conception of an ideal sanatorium for the treatment of patients suffering from pulmonary tuberculosis. He carried out my ideas most faithfully, and I here show photographs of the general view, the general plan, the detailed plan of the first story of one of the pavilions, and a drawing of the corner of the veranda, with an adjustable chair for the rest cure.

As will be seen, I have adopted a plan between the European and the American; in other words, the large pavilion system. Three pavilions, each accommodating about twenty patients, are united by galleries one hundred feet long, which serve for promenades on rainy days. Behind the central building are situated the winter-garden, dining-room, kitchen, and the administration building, all connected by covered passages. At some little distance we find, to the right and left, two medium-sized houses, one serving as a residence for the medical staff, the other as a place where visitors or the friends of the patients, desiring to

A. Pavilion for patients. B. Galleries uniting the pavilions. C. Dining-hall. D. Winter-garden. E. Kitchen. F. Administration building. G. Physician's house. H. House for the medical staff. I. Janitor's house. J. Laundry. K. Bathing pavilion. L. Recreation pavilion. M. Disinfecting-room. N. Stables. O. Turning pavilion.

Pavilion for
isolation.

be near them, may reside. At about two hundred and fifty feet from the main building, to the left, is a pavilion for the purpose of isolating patients. The necessity of such a precaution was shown me when, on visiting one of the sanatoria in Switzerland, I learned that a short time before a case of scarlatina had been discovered among the inmates of the one existing building, and as a consequence everybody who could had fled. Besides, even among the ordinary pulmonary invalids, the occasion for the need of isolation may arise. (In cases of gangrene, temporary insanity, etc., a separate, smaller pavilion will be indispensable.) On the opposite side of the other buildings, at a considerable distance, is situated the recre-

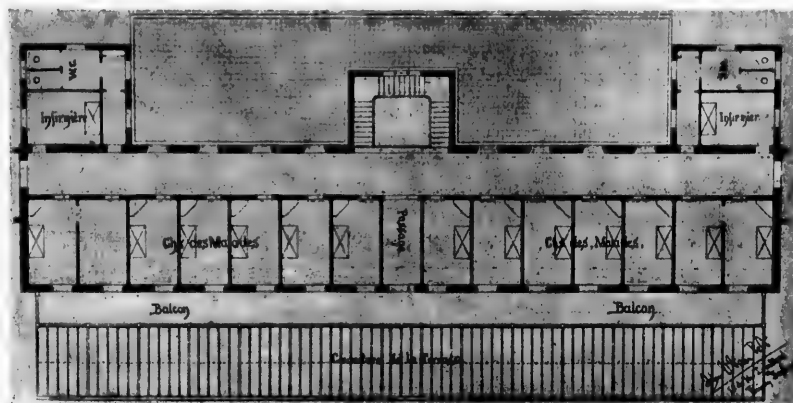


FIG. 66.—PLAN OF THE FIRST STORY OF ONE OF THE PAVILIONS.

ation pavilion, constructed so that two sides are always entirely open. The closed sides can be changed according to the direction of the wind. The rest of the buildings are houses for the gardener and stables for the horses, etc.

In front of the pavilions, on the south side, is the park, with its turning kiosks, sun-boxes, gradated paths, benches, etc. On the first floor of each pavilion are fourteen comfortable, well-lighted, well-ventilated sleeping-rooms for the patients, with two more rooms for the nurses; also the toilet-rooms, etc. On the ground-floor are the sitting-rooms, library, parlor, consultation-rooms, and

the room necessary for the hydrotherapeutic applications, and also several bedrooms for patients. The verandas, each 135 feet long and 15 feet wide, extend along the length of the pavilions; they are protected by a roof made partly of glass, provided with curtains, and arranged to make the prolonged stay of the pulmonary invalid as pleasant as possible; for it is here that he will have to pass the greater part of his time. For weaker patients, not yet able to go down-stairs or take their rest cure on the veranda, there is ample room to place a lounge, or even a bed, on the balcony opening directly from the rooms.

Besides the ordinary hygienic precautions and modern installations in regard to plumbing, heating, ventilation, water-supply, electric lights, electric fans in dining-rooms, sitting-rooms, etc., all angles throughout the house are rounded to prevent the accumulation of dust. The walls are painted so that they may be easily disinfected; the floors are of hard wood and may be easily mopped, as sweeping or raising dust is absolutely forbidden in a well-conducted sanatorium.

Sanitary
arrange-
ments and
precautions
against
fires.

In large buildings where many invalids congregate, of whom some may even be helpless at times, great precaution should be taken to prevent possible accidents by fire. There should be large staircases and hallways, lighted all night, a sufficient number of exits and well-kept fire-escapes, and, besides the ordinary firehose on each floor, portable fire-extinguishers should be distributed throughout the building. But equally important is the training of the nurses and other help for such emergencies. During my service at the Falkenstein Sanatorium I witnessed a few drills of the sanatorium fire-brigade, composed exclusively of the personnel of the institution. The alarm for the drill is given unknown to the nurses and help, but all patients were previously notified that at a certain time the fire-alarm bell would be sounded. These drills serve not only as a pleasant diversion to the patients, who could calmly look on upon the interesting feats performed by the firemen, but they also serve to give them a feeling of security.

Since it is the duty of the modern phthisio-therapeutist and sanitarian to avoid by all possible precaution the tuberculous infection of man through beast, he must also necessarily institute measures to protect the beast from tuberculous infection through man. The necessity of such precaution was strongly impressed upon me when visiting an institution in a State where much is

Protection
of animals
from
infection
through
man.

done in the direction of prophylaxis. This institution receives nearly two hundred patients annually, the majority being consumptives.

The following is one of the rules conspicuously posted throughout the house: "Patients must at all times, when in the institution

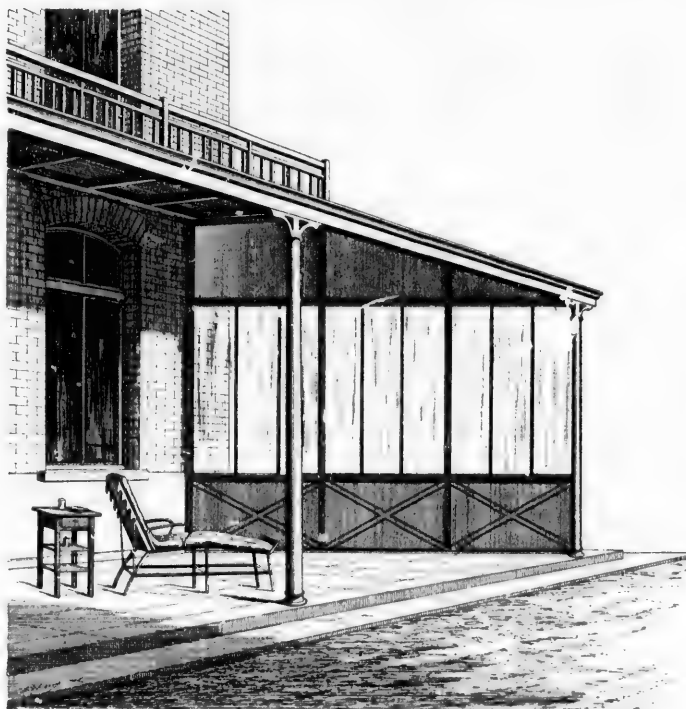


FIG. 67.—CORNER OF VERANDA, WITH ADJUSTABLE CHAIR FOR REST CURS.

or on the verandas, expectorate in the sputa-cups provided. They must never expectorate in the sinks, wash-basins, closets, or on the floor, or in their handkerchiefs." Outside the institution the patients are not restricted; they may expectorate wherever they please, and I have no doubt they do. I was told that a neighboring farmer, who had some time ago bought five healthy cows, had

them tested recently, with the result that three were found tuberculous. It seems thus to me unwise to have the dairy on or too near the premises of a sanatorium for consumptives. There will be occasionally a careless, unconscientious patient in all institutions of this kind who may expectorate on the surrounding grounds, where animals are likely to come in contact with the sputum on the grass.

In an institution for the treatment of consumptives there will be, of course, the strictest precautions concerning the tuberculous expectorations and other secretions. We have described at length in chapter IV (pp. 38-43) the various spittoons which should be in use in such a sanatorium. They should be the elevated spittoons in niches or on stands; the small, mug-like spittoon, which the patients may use during their rest cure; and, finally, the pocket-flask. Of all these there should be two sets, so that they are never wanting when one set is being cleaned and disinfected.

Each well-regulated sanatorium should have special facilities for disinfecting spoons, knives, and forks, which should be done after each meal. At the Falkenstein Sanatorium an especially constructed sterilizing apparatus is used for this purpose. All table-linen should be steeped in boiling water before being given to the laundry, and the same precaution should be exercised with the bed- and private linen of the patients. The rooms in an ideal sanatorium for consumptives should be submitted to a thorough disinfection by formaldehyde gas at regular intervals, and not only after the death or removal of a patient. A simple and thorough method of room disinfection we described on page 58.

Management and discipline in a sanatorium.

While it will not be possible to enforce a rule concerning the toilets of ladies in a sanatorium, the wearing of trailing dresses should not be permitted, and the gentlemen of the institution should not be allowed to smoke inside the buildings.

The discipline in an ideal sanatorium for the treatment of consumptives need not, of necessity, be too severe, but all those rules and regulations enacted in the interest of the patient and his surroundings should be religiously obeyed. A patient should not absent himself from the sanatorium without permission from the doctor.

It may not be amiss, in speaking of an ideal sanatorium, also to say a few words regarding the ideal management. Some of the European institutions are managed in two departments, presided

over by a medical director and a general superintendent, respectively. In some the former, in others the latter would be considered the superior in cases of conflict. While visiting the European sanatoria it has been my lot to witness such a conflict between the two heads of a sanatorium, and the lesson I learned therefrom was most valuable. In a sanatorium for the treatment of consumptives the medical director should always be the final court of appeal, as well in the general as in the medical affairs of the institution.

CHAPTER XII.

AËROTHERAPEUTICS, REST CURE, AND EXERCISES.

The main object of aërotherapeutics is to oblige the patient to live as much as possible in the open air. A patient arriving at a sanatorium and having a high temperature—for example, above 102° F.—should be left in bed and moved, during the day, toward the open window or on to the balcony. When his temperature goes down he is allowed to begin his rest cure (*Liegekur* of Dettweiler) on the veranda on a lounge, steamer-chair, or, better yet, on a reclining-chair especially constructed for the purpose, such as I illustrate on page 210. The back of this chair can be given any desired inclination.

It is needless to say that a patient, especially one coming from a sick-room in a large city, must only be submitted gradually to the exhilarating influence of a constant sojourn in the open air; but the endurance at which one may arrive in this respect is wonderful. In Falkenstein the patients remain out-of-doors on their chairs from seven to ten hours a day all the year round, in spite of fog, rain, wind, snow, and even with the thermometer at 12° C. below zero, and often no sunshine. Dr. Andvord, of Tonsaasen, Norway, wrote me that he leaves his patients on their chairs, wrapped up in furs, from five to nine hours a day at a temperature of -25° C.

It is to this prolonged stay in the open air (*Dauerluftkur* of the Germans) that the marvelous results obtained in these institutions may be attributed. Besides the rest cure in the fresh air, there is moderate exercise on graded walks in the garden—that is to say, on paths varying in inclination from one foot in three hundred to one in sixty. At night the patient sleeps with his window open, rain or shine, warm or cold; wide-open in summer, less so in winter. The only excuse for closing the window might be a very strong wind or a thick fog. A consumptive, if he wishes to get well, should live every moment of his existence in the purest and freshest air possible. During the rest cure on the reclining-chair

Precaution
during the
rest cure in
the open
air.

the patient is allowed to read or write, and is made as comfortable as possible. The main point to be attained is an almost complete muscular relaxation, in order to economize and store up strength and reduce the fever. When on their chairs on the veranda, patients should always be covered with blankets or lap-robcs, in accordance with the season; furs in winter are indispensable. There is always an attendant attached to the service to see that patients do not become uncovered while asleep.

Short naps after meals are allowed, but they should not exceed ten minutes or so. Consumptives are so apt to perspire when asleep any length of time, and especially when warmly dressed, that this might be the cause of their catching a severe cold. The patients watch over each other alternately to see that they do not sleep too long. Patients are warned, when taking their rest cure, never to let the sun shine directly on their heads. Congestion, headache, and other troubles often follow if this precaution is neglected.

The good results which are obtained by the rest cure in the open air are, indeed, at times wonderful; and still, with all due reverence for the great originator of the "Liegekur," the distinguished phthisio-therapeutist, Dettweiler, it is not without danger as it is practised in many European sanatoria. To have a patient lie on his back for three or four hours at a time without rising, and repeating this two or three times during the day, seems to me dangerous, for it facilitates hypostatic congestion of the lungs. I know of several cases where this condition has been brought about by thus remaining too long in the recumbent position. There is another reason why I do not favor this remaining undisturbed for hours on the reclining-chair. The local temperature of the back, being in constant contact with the warm cushions, will cause this part to become more sensitive to temperature changes than it had been, perhaps, ever before; and it seems to me easy to explain thereby why patients in institutions where the cure is practised as just described always complain of cold backs.

Value of
alternating
the "Liege-
kur" with
respiratory
exercises in
upright po-
sition.

It is for this reason that I think respiratory exercises should be made to alternate with the rest cure out-doors. The patient should rise every hour, or half-hour, to take these exercises. If this tires him too much he may, however, simply change his reclining position for the straight sitting position, raise his arms and go through the first and second respiratory exercises a few times. Should even the raising of the arms tire him, he may go

through the exercise by simply moving his shoulder-joints upward and backward, which is the exercise prescribed for pulmonary invalids when the raising of the arms is not practicable (p. 85). My experience has taught me that these exercises are of value in nearly all cases except in acute inflammatory processes, in frequent active pulmonary hæmorrhages, and whenever there is a constant temperature of 100° or more. I have described in full, and endeavored to illustrate, my system of breathing exercises in a preceding chapter on Preventive Treatment (pp. 82-86). As I stated there, they are alike beneficial for the predisposed and for the patient with developed pulmonary tuberculosis. For the latter a more strict medical supervision and a more careful gradation is, of course, necessary. It is true that whenever there are old pleuritic adhesions these extra respiratory efforts may cause moments of pain; the patient must, however, bear in mind that these pains are not lasting and are in reality salutary, being caused by the loosening of the fibrinous bands. By these breathing exercises the respiratory muscles become developed, the process of hæmatosis more complete, and the increased respiratory function helps to dissolve the mucus and makes cough and expectoration more easy. More advanced and very weak patients must content themselves with deep but quiet respirations without movement of the arms. Placing a pillow under the back of these patients so as to realize somewhat Sylvester's position, employed when artificial respiration is necessary, will be found a valuable adjuvant. It is interesting and pleasing to note how patients who have been bad breathers for years learn to love these exercises, so that it seems to them they can no longer live without going through with their regular performance at stated intervals.

There are in the market numerous apparatus invented for the purpose of performing certain alleged especially beneficial respiratory movements. I have experienced with several of them myself and had them tried by patients. These trials resulted in having abandoned all these mechanical devices, finding that the simpler the exercises and the less exertion there is required, the more readily will the patient carry out the instructions concerning them, and the more efficacious will they prove in the end.

The only instrument which seems to me of real value in stimulating the desire to take deep inspiration is Professor Alfred von Usedom's "Athmungs-Stuhl," or breathing-chair. The descrip-

Usedom's
breathing-
chair.

tion of this chair appeared for the first time in the "Aerztliche Politechnik" of May, 1898. The arrangement of the chair seemed to me so ingenious that I had one constructed for a patient who was in the habit of sitting and standing in a bent-over position (Fig. 68), and who needed a great deal of reminding to take his respiratory exercises. The result of making him sit on the breathing-chair, instead of an ordinary one, has been most gratifying. The main characteristic of the chair is the movable back, suspended by a cord at about the height of the middle of the back (Fig. 69).



FIG. 68.—USUAL ATTITUDE IN AN ORDINARY CHAIR.



FIG. 69.—PROF. USEDOM'S BREATHING-CHAIR.

This cord must be arranged loose enough to yield to forward and backward movements. During inspiration the upper portion of the back will be pushed backward, the lower portion forward. During the act of expiration the reverse process will take place. Since the two acts are automatic and regular, the lungs of the patient receive thus an energetic stimulus to deep respiratory movements. I should advise a number of such chairs as necessary to a complete equipment of a sanatorium. In fact, considering that the majority of chairs now in use have backs which rather

tend to make one sit in a bent-over position, I would recommend this sort of chair for more universal use, especially in schools, colleges, offices, etc. They would, no doubt, constitute one of the factors in the prevention of pulmonary diseases, and serve in a measure to overcome the so-called "habitus phthisicus," so characteristic of many consumptives.

Much has been written on the question of exercise in the open air for pulmonary invalids. Brehmer was much in favor of it and as much as possible of it in order to strengthen the heart, and some of our American phthisio-theraputists are of the same opinion. Dettweiler and his pupils, on the contrary, are opposed to it, except under restriction and the most careful supervision. The rest cure on the reclining-chairs, as above described, is even now admitted in the sanatorium created by Brehmer. It seems to me that the wisest course to pursue would be to consider each individual case, and prescribe or forbid exercises according to the condition and the strength of the patient.

We have already spoken of graduated walks of various inclinations to test the patient's strength in regard to his climbing powers. The duration of a promenade should be graduated with equal care. One should commence with a walk of a few minutes until a walk of an hour or an hour and a half can be taken without producing fatigue. Wherever it is practicable these excursions should begin up-hill, so that the return is easy. After his promenade the patient's temperature should be taken. If it exceeds the normal it is an indication that the patient has overtaxed his powers. Whether complete rest or simply shorter walks are then indicated will be decided by the variation of the temperature before and after exercise. When the temperature of the patient only rises slightly in the evening (99° – $99\frac{1}{2}^{\circ}$ F.), short walks in the morning, while in the apyretic state, may be permitted. A lasting temperature of 100° F. or over is an absolute contra-indication to exercise. Tachycardia should also be considered as such. If there is, however, a chronic tachycardiac condition, absolute rest might not be the best policy. But these patients, more than any others, should be warned against the slightest overexertion. Breathing exercises and walks may be combined, the patient taking three to five of the exercises above described, with or without moving the arms, in every 150 to 200 steps.

Walking
exercises.

CHAPTER XIII.

THE PNEUMATIC CABINET IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

In the modern therapeutics of pulmonary diseases the pneumatic cabinet takes its place in importance immediately after general aërotherapeutics. To the physicians who have used it persistently and studied its effects, it certainly has rendered valuable services. Still, I am aware that it is relatively little known, and thus it may, perhaps, not be amiss to describe its construction somewhat in detail.

Descrip-
tion.

The pneumatic cabinet has the form of a tall safe, somewhat larger at the bottom than at the top. Its door and apertures close hermetically. It is large enough for a patient to sit comfortably inside. The front is composed, in part, of a large plate of glass through which the operator, manipulating the lever, watches the patient. By a system of valves, bellows, and lever, compressed or rarefied air can be produced. An opening through the frontal glass plate serves for communication with the outside air, which the patient inhales through a rubber tube. The amount of incoming air can be regulated by the stop-cock of a faucet. The degree of rarefaction or compression is indicated by a manometer in communication with the inside atmosphere of the cabinet. I append a drawing of the pneumatic cabinet in my possession, which is the model now used by nearly all phthisio-therapeutists who employ this instrument.

The principle of the cabinet in the treatment of pulmonary tuberculosis is to diminish the weight of the atmospheric pressure, which at the sea-level, under normal conditions, is about fifteen pounds to the square inch. With the aid of the cabinet it can be reduced nearly to fourteen pounds to the square inch.

The action of the pneumatic cabinet has been described by

many authors, such as Bowditch,¹ Fox,² Houghton,³ Hudson,⁴ Jensen,⁵ Ketchum,⁶ Westbrook,⁷ Williams,⁸ and others. In perusing the extensive literature on the subject I found Platt's⁹ exposition one of the clearest. His experience concords with mine in almost every detail. He describes the action of the pneumatic cabinet as follows: "Such portion of the thoracic cavity as is not occupied by tissue—muscular, glandular, the parenchyma of the lung, etc.—consists of air-space and blood-space, and it is obvious that the increase in one of these will tend to the diminution of the other. The respiration of air at the normal tension while the body is immersed in a rarefied atmosphere is, in effect, the same as the introduction of a compressed atmosphere into the air-space of the lungs; it will increase the air-space and tend to diminish the blood-space, driving a certain portion of the blood from the lungs into the general circulation, which is subjected to a diminished pressure. The pulmonary congestion is diminished in exactly the same way as the congestion of an inflamed joint or of an ulcer by bandaging. Or, to put it in another way, the blood is sucked or drawn out from the lungs into the general circulation, as it is sucked into the space beneath a cupping-glass.

"This I believe to be the main action of the cabinet, the reduction of pulmonary congestion, and the theory is practically verified by our experience with regard to blood-spitting and bronchial hæmorrhage. Time and again, patients have come into the office complaining of the sputa being blood-streaked, and, almost

¹ V. Y. Bowditch, "Boston Med. and Surg. Jour.," July 16, 1885; and "Journal of the Amer. Med. Association," Aug. 1, 1885.

² Sidney A. Fox, "A Report of Sixty-nine Cases of Lung Disease Treated with the Pneumatic Cabinet," "New York Med. Jour.," June 26, 1886.

³ A. F. Houghton, "Journal of the Amer. Med. Association," Nov. 7, 1885.

⁴ E. Darwin Hudson, Jr., "Present Status of the Pneumatic Treatment of Respiratory Diseases," "Med. Record," Jan. 9, 1886.

⁵ Dr. Jensen, same journal and date as Dr. Houghton's article.

⁶ Jos. Ketchum, Esq., "The Physics of Pneumatic Differentiation," "Med. Record," Jan. 9, 1886.

⁷ Benj. F. Westbrook, "Pneumatic Differentiation," "New York Med. Jour.," Jan. 26, 1886.

⁸ H. F. Williams, "Antiseptic Treatment of Pulmonary Diseases by Means of Pneumatic Differentiation," "Med. Record," Jan. 17, 1885; "Pneumatic Differentiation," "New York Med. Jour.," July 16, 1885.

⁹ Isaac Hull Platt, "On the Practical Application of the Pneumatic Cabinet," "New York Med. Jour.," June 26, 1886.

without a single exception, the use of the cabinet has relieved the symptom in the course of a few minutes.

"In addition to the effect it has upon the pulmonary congestion, it undoubtedly acts beneficially in other ways. The thoracic gymnastics afforded by expiration against increased resistance will probably be of benefit to the weak-chested. The increased

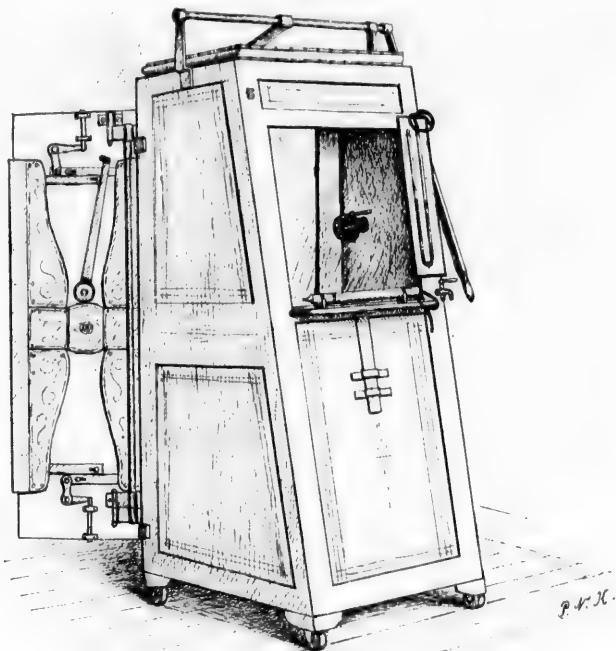


FIG. 70.—PNEUMATIC CABINET.

oxygenation of the blood will, doubtless, improve the nutritive processes. Then the spray, if proper medicaments are used, may be expected to act beneficially upon the accompanying bronchitis."

Quimby,¹ who is, perhaps, the best authority on the subject of cabinet treatment in pulmonary tuberculosis,—for he has used the cabinet longer and more persistently than any other phthisio-

¹ Quimby, C. E., "The Pneumatic Cabinet in the Treatment of Pulmonary Phthisis," "Internat. Med. Magazine" for January, 1893.

therapeutist I know of,—gives as the conclusion of a most remarkable paper on this subject, read before the American Climatological Association in Richfield Springs, N. Y., June 24, 1892, the following interesting table :

RELATIONS OF THE PNEUMATIC CABINET TO THE DESTRUCTIVE FORCES OF PULMONARY PHTHISIS.

Quimby's
conclu-
sions.

T H E C A B I N E T	A. SPECIFIC.	
	1. Does not directly affect	1. The tubercle bacillus.
	2. Limits by rapid absorption	2. Tubercle toxine necrosis.
	B. LOCAL AND MECHANICAL.	
	3. Diminishes	3. Tissue and vascular compression from
	By (a) absorption of	(a) Inflammatory exudate.
	(b) removal of	(b) Necrotic products.
	4. Loosens and removes	4. Alveolar and tubular obstruction, causing
	Thus (a) Reopening	(a) Collapsed alveoli.
	(b) Allaying	(b) Local tissue irritation.
	(c) Restoring	(c) Deficient oxygenation.
	(d) Diminishing	(d) Septic decomposition.
	(e) Preventing	(e) Systemic infection.
	(f) Minimizing	(f) Septic fever.
	5. Stretches and absorbs	5. Pleuritic fibroses, arresting
	Thus, Restoring {	(a) Respiration } (Oxygenation).
		(b) Circulation }
	C. SYSTEMIC.	
	6. Diminishes and retards	6. Systemic malnutrition from
	By (a) Removing	(a) Respiratory obstructions.
	(b) Increasing	(b) Weak circulation.

RELATIONS OF THE PNEUMATIC CABINET TO THE CONSTRUCTIVE FORCES OF PULMONARY PHTHISIS.

T H E C A B I N E T	A. SPECIFIC.	
	1. Increases nutrition of	1. Tubercular granulations.
	2. Makes dynamic	2. The potential value of toxine (?).
	B. LOCAL.	
	3. Favors and moderates	3. Productive inflammation, depending on
	By (a) Traumatic increase of	(a) Local irritation.
	(b) Removing obstruction to	(b) Freedom of circulation.
	(c) Augmenting	(c) Nutritive vascular supply.
	(d) Increasing	(d) Lymphatic absorption.
	4. Stimulates	4. Local tissue vitality, depending on
	By (a) Increasing	(a) Circulation.
	(b) Restoring normal	(b) Anatomical conditions.
	C. SYSTEMIC.	
	5. Stimulates	5. General glandular activity from
	By (a) Improving	(a) Circulation.
	(b) Doubling	(b) Respiratory capacity.

When I first began to investigate the pneumatic cabinet treatment, I saw it used as I believe it is now still used by the majority of physicians. The patient enters the cabinet completely dressed, he inserts the tube into his mouth, and the operator manipulates the lever from five to ten minutes, retaining the manometer at the height of about an inch. The good effect of this treatment, it seemed to me, could be heightened by some modifications which suggested themselves to me in the course of my own experience with the cabinet. I have refrained from publishing these modifications, for the simple reason that I wished to see their utility verified by larger experience. Now, after having used the cabinet treatment with my modifications in quite a large number of cases in hospital and private practice, and in most instances for many months at a time, I feel more prepared to publish the system I have adopted in connection with the use of the cabinet in pulmonary tuberculosis.



FIG. 71.—TUBE WITH NOSE-MASK.

Author's
modification
of the
cabinet
treatment.

With the exception of the very weakest and highly febrile cases, nearly all tuberculous patients can take the pneumatic cabinet treatment. Before admitting my patients into the cabinet I teach them how to breathe. They must first take a course of respiratory exercises, such as I described in chapter VII, and only after they have learned to use their respiratory muscles to the best advantage do I begin the treatment, with short séances at first. Any mechanical obstruction to proper breathing has, of course, been looked after previous to the commencement of the respiratory exercises. Any intercurrent acute coryza must be attended to before putting the patient in the cabinet. Besides the general treatment, these coryzas should be treated locally by either the application to the nares of a one or two per cent. solution of cocaine, or by cleansing with and spraying of liquid albolene, benzoinol, alphasol, or other mild antiseptic solution. I insist upon proper breathing through the nose, and the conditions necessary thereto, for the reason that I have abandoned the custom of having the patient put the rubber

breathing-tube in his mouth. To this end I had nose-masks constructed, which, owing to the malleability of their posterior portion, can be molded to fit the form of any nose. The patient either holds the mask, pressing it to the face, or it is fastened by a strong elastic band encircling the head. A little cotton or a thin cloth placed between the nasal bones and the malleable portion of the mask will prevent the possibility of the outside air entering the cabinet. The anterior portion of the mask is attached to the ordinary rubber tube, which, in turn, is fastened to the cabinet end of the faucet. The accompanying drawing will illustrate both.

I have found this system of natural breathing superior to mouth-breathing, and many of my hospital patients who had been also treated by my predecessors, but with the mouth-tube, have again and again assured me that they not only liked the nose-breathing better, but that they felt better after it than when they breathed through the mouth. They felt that they got just as much air into their lungs as with the old system. I mention this to answer the objections which were made by some of my colleagues at the hospital, who claimed that the patient does not receive enough air through the nose-mask. After having placed my patient in the cabinet, I open widely the window of the room in which the cabinet stands. I do this in office as well as in hospital practice, be it summer or winter, rain or shine, to assure my patient the purest and freshest air obtainable. Since the patient breathes through the nose, the possibility of catching cold is removed, though the outside temperature may even be severely cold. In very anæmic individuals I occasionally combine ozone inhalations with the cabinet treatment.

My second modification in the pneumatic treatment consists in having the patient enter stripped to the waist, and the trousers or skirts loosened, that not only a free thoracic but also a free abdominal breathing may be possible. My reasons for exposing the cutaneous surface of the thorax to direct contact with the rarefied air are threefold:

1. There is no outside restriction whatsoever to fullest expansion of the lungs—a thing which is not possible for a woman wearing a tightly laced corset and numerous skirts tight around the waist. Even a man will breathe easier with trousers loosened and suspenders removed.

2. The cupping effect, if I may call thus the action of the cabinet which relieves over one-half pound of atmospheric

pressure per square inch, is heightened by removing several intervening layers of clothing.

3. It does the cutaneous surface good to get a chance to breathe directly, as it acts also as a respiratory organ; in other words, the skin of the chest, made especially sensitive in nearly all consumptives through exaggerated warm dressing, will become less sensitive by systematic exposure to the air.

To prevent the patient from taking cold the window is closed before he is allowed to leave the cabinet; and if he should feel very warm, or if he should perspire, as patients sometimes do, a large Turkish towel is thrown around his shoulders, wherewith he produces vigorous friction over chest and back before dressing.

To make the use of the cabinet as comfortable for the patient and at the same time as effectual as possible, I have added two minor modifications in its use. I had a stand constructed with a semicircular board top, which, placed in the cabinet in front of the chair, enables the patient to rest his arm when holding the nose-mask. This stand can be fixed at any desirable height. The other minor modification consists of a little cap made of two layers of metallic gauze, placed over the external opening of the stop-cock communicating with the tube. Between the two layers absorbent cotton can be placed in order to filter the air which enters the tube when the patient inhales. The cotton can also be impregnated with whatever medicinal substance the physician thinks most appropriate. I give the essence of peppermint the preference for such purposes, for it has a soothing, cooling influence on the irritated membranes.

Like all respiratory exercises, the pneumatic-cabinet treatment should be begun carefully and gradually. I usually commence with a séance of two minutes, increasing the duration from day to day up to six or eight minutes. At first the séances should be given once every day. As the patient's respiratory function becomes more perfect and the disease tends toward recovery, the sittings need not be quite as frequent. Longer séances than eight minutes are seldom indicated. About one inch of elevation, shown by the manometer, suffices to reduce the atmospheric pressure a little more than half a pound to the square inch. This reduction is all that is needed to produce the desired effect.

My patients, with rare exception, look forward to their séance with pleasurable anticipation, especially when there is a tendency

to dyspnoea. I have entered the cabinet myself, my assistant working the lever, in order to experience the sensation so vividly described by some of my patients. I cannot say that at first the feeling of being inclosed in such a small space, with only a tube to breathe through, is a pleasant one. The first movements of the pump produce an almost painful sensation in the ears, but, by and by, with the exhaustion of the air, and by swallowing a few times, this ceases and there comes a feeling of freedom. The respiratory muscles seem to expand to a much greater degree; the fresh, cool air, entering through the nose, arrives in the lungs sufficiently warmed not to be harmful, penetrating habitually unused portions of lung-substances. There comes, and remains for hours afterward, a feeling of exhilaration analogous to that experienced on mountain-tops. On the action of the cabinet on the various pathological conditions in pulmonary tuberculosis, I have cited the experiences of Platt and Quimby; as stated above, I may repeat that they coincide in nearly every respect with mine, and I can recommend the judicious use of this method of aërotherapy most earnestly. I think that the few modifications which I have instituted in connection with the employment of the cabinet will tend to increase its usefulness.

CHAPTER XIV.

HYDROTHERAPEUTICS IN THE GENERAL TREATMENT OF PULMONARY TUBERCULOSIS.

After aërotherapy, hydrotherapy comes next in importance in the treatment of pulmonary tuberculosis. Of the tonic effects of cold water, and its stimulation of the general system, we have already spoken in the chapter on Preventive Treatment. The general education of the cutaneous and nervous systems of a patient whose body has not been accustomed to the extensive application of cold water is especially imperative in the case of a consumptive. How this should be done has been described in detail on page 87. Presuming, then, that the patient has gone through the usual preparatory course of dry friction, friction with alcohol, with water, etc., we come to the douche. So as not to produce too great a shock, I begin by directing a gentle stream toward the feet, then rapidly upward as far as the hips; then I apply the spray uniformly all over the body, and direct also a small jet with a little more force over the apices. Apparatus for this kind of douche can easily be constructed in a sanatorium, or even in a private dwelling.

Exercise
during the
application
of cold
water.

There is one thing, however, which I would insist upon in the arrangement of a douche-room. A patient should be taught to exercise as many muscles as possible during the application of cold water. To this end he should take hold of a bar fastened across the room at about the height of his shoulders. This prevents his slipping on the wet floor while he moves his thorax from side to side, raises his feet alternately, moves his arms, and, in short, agitates his whole body as much as possible. The shock produced by the cold water is thus much lessened and a more speedy reaction assured. Of course, the large towel to envelop the patient from head to foot is necessary, over which the bath-attendant uses vigorous friction to favor a proper reaction and return to warmth. In some cases of tardy reaction warming the towels is indicated.

Baruch's ingenious douche apparatus, of which I give a repro-

duction, could, with a few additions, become an ideal installation for a large sanatorium for consumptives. These additions should be the cross-bar, just mentioned, in front of the circular douche apparatus, and an arrangement permitting direct jets to be given from above over the apices. For this purpose two apertures could be conveniently placed one on each side of the rain douche (*R*). Here is a description of such an installation as given by Dr. Baruch

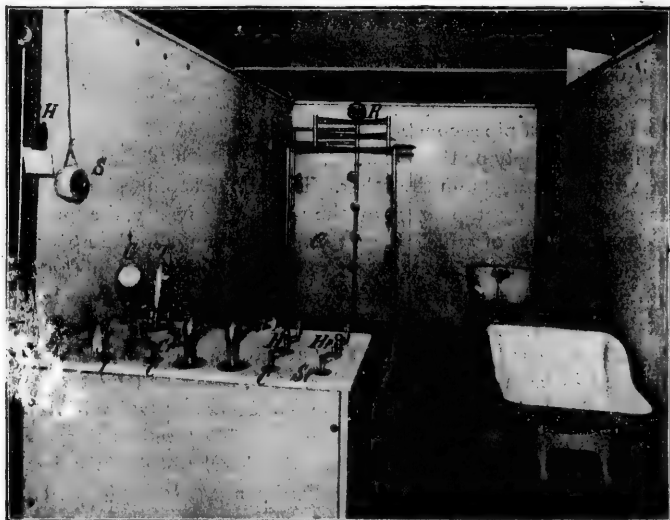


FIG. 72.—DR. BARUCH'S DOUCHE APPARATUS.

PH, Prescription-holder. *S*, "Second" clock. *H*, Hot water. *I*, Ice-water. *C*, Cold water. *P*, Pressure regulator. *B*, Bell. *G*, Gauge. *T*, Thermometer. *R*, Rain douche. *Cy*, Circular douche. *CJ*, Cold-jet douche. *HJ*, Hot-jet douche. *H*, Hot water for Scotch douche. *C*, Cold water for Scotch douche. *Hp*, Hip-bath. *St*, Steam douche.

himself, in his excellent book on the "Principles and Practice of Hydrotherapy"¹:

"A waiting-room and a number of dressing-rooms having been provided, a room containing two or more cots for packs is set aside, and another for massage. A space twelve feet or more square is utilized for a douche-room. This should be constructed with marble walls and be supplied with ample light and heat. Above

Baruch's
douche-
room and
apparatus.

¹ Published by Wm. Wood & Co., New York.

a water-proof floor, which slants sufficiently to carry water into a pipe leading to the sewer, a level, slatted floor should be laid in sections, to facilitate removal for cleansing, in such a manner that all the water used upon the patient's may readily flow through the interstices between the slats upon the water-proof floor beneath. Upon the upper extremity of this floor a circular douche may be secured. Adjoining this a large bath-tub and sitzbath-tub may be placed, the latter having sufficient space to admit an attendant behind it. The douche-table should be so constructed that its supply of hot, cold, and ice water is sufficient for all requirements.

"The douche-table is a box four feet long, three feet high, and two feet wide, covered with marble. Inclosed within the box is a combination of pipes connected with the hot and cold water-supplies and steam-supply on the one hand, and with the hose and other terminal arrangements on the other. The hot and cold water-supplies are controlled by stop-cocks by the usual contrivance, the terminal rods and levers of which issue through openings in the upper flat portion or slab of the douche-table, as may be seen in the diagram. The attendant, standing behind the table, is protected against receiving the water recoiling from the patient, and is perfectly free to regulate the outflow according to the prescription ordered in each case. An outflow pipe, controlled by the stop-cocks, *P* and *R*, regulates the pressure of the water, which is plainly indicated upon the gauge. This enables the attendant to arrange any pressure required, either before the douche is administered or while it is flowing upon the body, the range being from ten to thirty-five pounds. A thermometer, *T*, is so arranged that its bulb, encased in an open-work metal tube, lies within the mixer, whose outlet pipe leads to the hose; and its upper portion, cased in metal also, shows through a magnifying glass-tube cover the temperature of the water flowing upon the patient. A 'second' clock, *C*, furnishes information regarding duration, while the clasp, *Cl*, holds the prescription out of reach of the spray. The apparatus is put into operation as follows:

"The attendant places the prescription in the clasp after carefully scanning it, and opens the stop-cocks which close the nozzle. He now opens the hot and cold-water faucets, and, watching the thermometer, obtains the temperature required while the water is flowing. This may be done with the greatest ease after some practice. He now opens the pressure regulator until the gauge

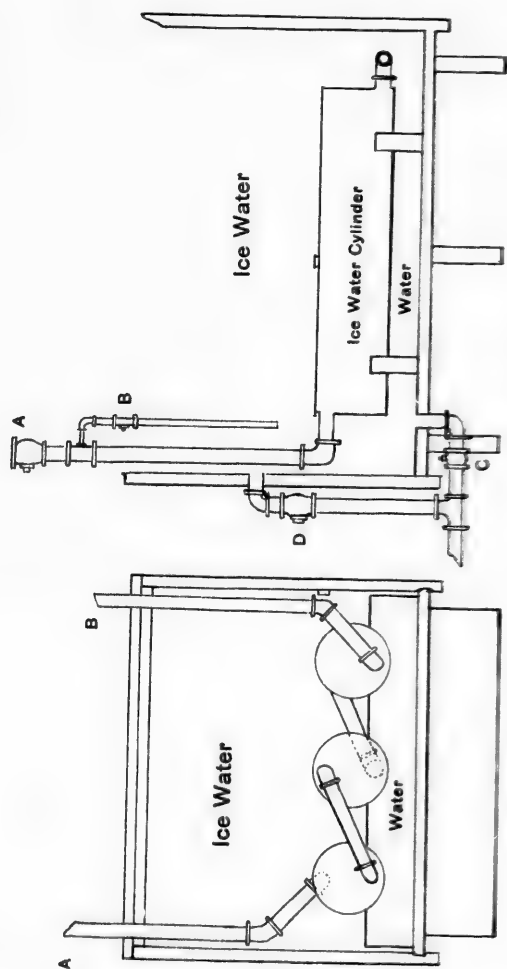


FIG. 71.—DIAGRAM OF (WATER) COOLING APPARATUS.

registers the pressure prescribed. The attendant having examined the thermometer again, and holding the faucet-handle in the left hand, while the right holds to one side the hose from which the stream of water is issuing, requests the patient to place himself six feet in front of the douche-table. Again looking at the thermometer to insure the exact temperature prescribed, he now directs the stream upon the patient's back; other parts are treated successively as ordered by the physician. If a circular douche is ordered, the water is also turned on before the patient enters it. This is important, not only because shock is thus prevented, but timidity of the patient is overcome.

"The *circular douche* used here differs, as the diagram shows, from the usual needle-bath, in not being supplied with semicircular, perforated pipes. I found the effect greatly enhanced and much trouble from stoppage avoided by the substitution of eight roses, three inches in diameter. Each rose contains fifty fine openings in the plate, which, being screwed on to the connecting-tube, may thus be easily freed from accumulating sand and dirt. Moreover, the three upper roses are, by a device of Mr. Frank Richter, made movable. By simply turning these roses downward, an adult of any height may be treated without having the face sprinkled or the ears filled with water.

"The douche-table contains pipes the outlets of which are controlled by lever faucets, which also open and close the perinæal douche, the hip-bath, and the full bath. The temperature of these may thus be controlled by the attendant by simply watching the thermometer of the douche-table.

"There should also be a steam douche, supplied with low-pressure steam from the engine-room, which may be made to issue from the hose by opening the faucet *Sz*.

"The douche-room is twelve feet long and eight feet wide, its walls being covered with marble eight feet high. The floor of this compartment is slanting and covered with copper; the edges of the latter are secured by being turned up two inches behind the lower edge of the marble wall. Beams cut slanting on the lower side to fit the water-tight floor, and straight on the upper side, are laid horizontally, so as to support a slatted floor, through which all the water flows upon the copper beneath and thence to the sewer.

"The water-supply comes from a reservoir (under the roof), to which it is pumped by a steam-engine. The hot water is furnished

from a drum which is heated by steam coils. Both cold and hot water flow through appropriate pipes to the douche-table, and ice-water, which is required in summer, is furnished by a cooling apparatus constructed as follows: In the basement is situated a box, seven by five feet and four feet high, which has double walls four inches apart. A manhole, $2\frac{1}{2}$ feet square on top, admits of ice being thrown in. The box is lined with copper, so as to be water-tight. At the bottom two boards, two inches thick and one foot deep, are placed from one side to the other. These have three semicircular notches, fitting three galvanized-iron cylinders, for which they form a support.

"The cylinders contain thirty gallons each and are connected with each other by inch pipes. The first cylinder receives the water-supply from a two-inch main. The water entering this cylinder passes to the second, thence at the opposite end to the third, from which it issues into an inch pipe leading to the douche-table in the room above.

"Six inches above the level of the cylinders an inch opening exists, which is connected with the sewer. A separate pipe, supplied with a stop-cock, should also lead from the main directly into the box, for the purpose of filling the latter with water as high as the outlet above the level of the cylinders.

"The box is elevated about one foot from the floor, and an out-flow pipe with stop-cock should be securely connected with the latter and lead to the sewer, for the purpose of emptying the box when necessary. The apparatus is prepared as follows: The stop-cock of the pipe *A*, leading from the main, is opened for the purpose of filling the cylinders; the stop-cock *C* at the bottom of the box being closed, the stop-cock *B* is opened and water is allowed to flow into the copper-lined box until the cylinders are covered with water six inches deep. Now half a ton of ice is put upon the cylinders. It will be observed that the lower portion of the ice-supply lies in six inches of water, which covers the cylinders. Thus the latter are not only covered by ice, but surrounded by ice-water. As the ice melts, the overflow of water issues through the opening *X* to the stop-cock *D*, which is always left open.

"The necessity for this ice-water supply will be evident when it is borne in mind that in midsummer, when the temperature of the water may range from 70° to 80° F., a prescription for a

douche of 50° to 60° F. could not be filled without such a supply. It is necessary only to open the ordinary cold-water supply-cock, as is needed, to reduce the former to the temperature prescribed."

Improvised
douche-
arrange-
ment.

In cases where the visit to the douche-room is either inconvenient or not safe, I resort to the following simple method: A wooden chair is placed in a large, circular, English bath-tub, and the patient sits astride the chair, holding the back with his hands and bending his head slightly forward. Then two, four, or more pitchers of cold or tempered water are rapidly poured over the shoulders. In cases where the reaction is feeble the patient is quickly put back into his warm bed, even if not thoroughly dry.

Time, tem-
perature
and dura-
tion of
douche.

The best time to take the hydrotherapeutic application is in the morning, half an hour or so after a very light breakfast. Patients accustomed to heavy breakfasts should take such after their douche and morning walk, but should take a glass of milk with a slice of buttered toast before leaving their room. A morning walk should, if possible, always precede the douche. This is for the purpose of creating what French hydrotherapeutists call a preaction.

Every douche or affusion should also be followed by a short walk or a return to bed, according to the indication of the case. The cold douche should never last longer than twenty to twenty-five seconds, and one should always begin gradually, not giving more than five seconds at first. The temperature may vary from 60° to 40° F. Only in exceptional cases would one need a more precise graduation of the temperature.

The complicated procedure of the dripping sheet seems to entail too great a strain on the patient, and I do not favor it in phthisio-therapeutics. Wet-packs, on the contrary, over the thorax, seem to exert a soothing influence whenever there are pleuritic or intercostal pains, or that vague and undetermined feeling of discomfort in the chest. Lateral douches, not too strong, directed toward the seat of old pleuritic adhesions, often aid considerably in the resorption of the fibrinous bands and a consequent free chest-expansion.

In patients above fifty, it must be remembered that the usual reaction after a cold douche is slow to come, and in such cases it is best not to use the water too cold. A chilly sensation, continuing even after thorough drying and friction, should in all

cases be a warning and a guide regarding temperature and duration of the douche. There are idiosyncrasies which must also be considered with some patients in regard to the application of a cold douche.

Of the other uses of cold water in pulmonary tuberculosis we will speak under symptomatic treatment.

CHAPTER XV.

PERSONAL HYGIENE AND DRESS OF THE TUBERCULOUS PATIENT.

The care of the skin is an essential part in phthisio-therapy. As a rule, a tuberculous patient should take his hygienic baths regularly once or twice a week. It should be of short duration, not too warm, and followed by a rapid sponging off with cold water. The best time to take the hygienic bath is in the evening, before retiring. A pulmonary invalid should never take his bath without there being some one within call, in case he requires any assistance. When the skin is especially dry, nothing will be better than an occasional massage with vaseline or some other oily, not irritating substance.

Whether a consumptive uses a pocket-flask, squares of muslin, or a paper spittoon for the purpose of expectorating therein, it is well to repeat here that he should be enjoined to wash his hands always most thoroughly before touching food. Of the harmful effects of swallowing the expectoration, we have already spoken when treating of infection by ingestion (chap. iv).

General
rules con-
cerning
dress for
both sexes.

Consumptives should dress sensibly, comfortably, and according to the season. They should avoid heaping successive layers of clothing upon themselves, especially in the line of so-called chest-protectors. These latter, or the numerous woolen undershirts, often worn by the pulmonary invalid, have been in many cases the very cause of contracting repeated colds by having rendered the individual too sensitive. Consumptives should have warm outer garments for winter, but not so heavy as to hamper their movements. For under-garments, Jäger's or similar sanitary wool suits, the lighter or heavier grade, according to the season or the climate, are to be recommended. The shrinking of these garments can be prevented by well-prepared soapsuds and the use of proper stretchers during drying. To overcome the unpleasant pressure caused by the suspenders, to which the consumptive is more sensitive than others, this article of dress might be replaced by a sort

of vest, of light, elastic material, to which the trousers are attached, thus distributing the pressure over a larger surface. Instead of four or six there are eight to ten attachments (see illustration). Whenever and wherever conventionalism does not reign supreme, the starched linen should be replaced by the light, woolen, negligée shirt. It permits better ventilation and freer respiratory movements. Men with a good head of hair need not fear to go uncovered at times, but all, even those with thin hair or bald heads, should not wear too heavy hats or caps, and should always have them well ventilated.

Headwear
for men.

In the chapter on Infection by Ingestion, we stated already that to wear no beard and no mustache would be the most hygienic practice on the part of the consumptive; but since it is very hard to enforce rules, the carrying out of which would change the appearance of a person often to a considerable degree, it is best to simply advise the tuberculous invalid to keep his beard and mustache as short as possible, and to wash the same with warm water regularly a few times during the day.

As a matter of personal hygiene for pulmonary invalids, I should again suggest not to make use of tobacco in any form whatever.

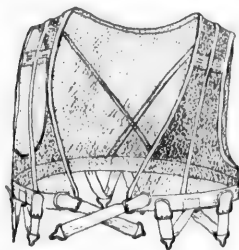


FIG. 74.—VEST-SUSPENDERS.

For the women I would recommend the Lady Habberton or Jenness Miller system of dress reform. It may not be amiss to give a short description of the system here, for, while it may enjoy a certain popularity among sanitarians, I cannot say that the majority of ladies seem to be very familiar with this reform. "Dame Fashion" has, no doubt, a great deal to do with the seemingly total ignorance of this most healthful mode of dress among otherwise well-informed ladies.

Jenness
Miller
system of
dress for
women.

According to the fundamental rules for dress reform as advocated by Lady Habberton, Mrs. Miller, and others, the garments are arranged so that they follow the symmetrical lines of the female form, and in all possible cases are made of one piece. Each limb is properly clothed in its turn. Legs, arms, and neck are comfortably and closely protected, while the body is wrapped a little tighter. The under-garment is made all in one piece, and with no bands

around the waist. If a corset must be worn it should be corded or stiffened with a few whalebones and never tightly laced, which, with the weight of the heavy skirts fastened tightly around the waist in the usual manner, renders all abdominal breathing impossible. As has been already stated in our chapter on prophylactic treatment, abdominal breathing is as natural to women as it is to men and animals.

Next to this under-garment, or union suit, a so-called "chemilette" is worn, made on the same principle as the under-garment, but of looser and lighter material. The third in order is the so-called "leglette," a divided skirt and waist attached, which gives the wearer great comfort and freedom of motion. It can be made of almost any material. And now as to the outside dresses: They are made as nearly as possible in the styles in vogue, but never with trains, and in them all are preserved the physiological features of the female form. In the complete toilet all garments are so arranged that their whole weight is supported by the shoulders, and no pressure whatever brought to bear upon any of the vital organs in either thoracic or abdominal cavity.

I have frequently seen ladies dressed according to this sensible mode, and I can assure the doubting reader that they looked to me and to others more becomingly dressed and more graceful than those arrayed in the very latest fashion, whose waists have been reduced by tight-lacing, changing their appearance, perhaps, from the figure of a Venus to something resembling two cones placed with their summits in apposition.

Footwear.

Phthisical patients should keep their feet warm and dry, and should never wear tight shoes. Rubber shoes when it is wet, fur-lined ones when it is cold, and hot-water bags or bottles at their feet when lying on their chairs in winter, should be recommended to attain this end.

CHAPTER XVI.

DIETETIC TREATMENT OF PULMONARY TUBERCULOSIS.

To nourish the patient, to feed him well with good food, or rather overfeed him so that he assimilates more than he expends, forms an important part of the treatment of phthisis. The patient should have an abundance of proteids, carbohydrates, and fats, but in proper proportion; thus the menu for a tuberculous invalid should be much varied. He should never have a diet exclusively of meat, nor of vegetables; a mixed diet, with some eclecticism as to the more digestible substances, should be the rule. Meat, milk, fats, eggs, vegetables, bread (cereals), fruits, especially grapes, should all contribute to the diet of the patient.

Consumptives, as a rule, have small appetites, and it requires sometimes no little art to make them eat. The one important truth that they should be made to understand is that their digestive powers are far greater than their appetite indicates. Leaving exceptional cases aside, such as absolute anorexia, hyperacidity, or lack of gastric secretion, of which we will speak later, one usually succeeds in making the patients eat by persistent persuasion, and by offering them a variety of food arranged as appetizingly as possible.

The meals given the patients in the leading European sanatoria are about as follows: In the morning—half-past seven to half-past eight o'clock—they have bread and butter and honey, with cocoa, coffee, or chocolate, and two or three glasses of milk taken slowly in small swallows. At ten o'clock they have bread and butter, cold meats, fruit, etc. At one o'clock the dinner—soup, fish, three kinds of meat, vegetables, salad, preserves, dessert, and fresh fruit, with one or two glasses of wine. At four o'clock they have a glass of milk, with bread and butter. At half-past seven there are thick soup, meat and potatoes or rice, cold meat, bread and butter, salad, and cooked fruit, with again one or two glasses of wine. At nine o'clock they take a glass of milk with two or three teaspoonfuls of cognac.

To eat a great deal of butter and cream is especially to be recommended to pulmonary invalids, and milk should be allowed at any time without restriction. However, some patients, in their eagerness to get fat, overdo in this respect. When drinking numerous glasses of milk between meals interferes with the proper appetite at meal-times, the number of glasses should be reduced accordingly. Again, neither milk nor cream agree well with some consumptives. To make the latter more digestible, one may add to each wineglassful one-half or one teaspoonful of cognac, kirsch, or rum, with or without hot water. Milk may be rendered more digestible by adding to each tumblerful about six grains of bicarbonate of soda and five grains of common salt, dissolved in two tablespoonfuls of hot water.

The pulmonary invalid must be treated and fed in accordance with what he was accustomed to before being taken sick, for meal-times and number of meals differ among most nationalities.

Average
regime.

For average cases I would suggest the following regimen, to be adhered to as nearly as possible during the course of the disease : As soon as the patient awakes in the morning, while yet in bed, a glass of hot milk, half milk and tea, or half coffee and milk, with a slice of milk-toast, should be given him. After a little while he will rise to prepare for his douche, friction, or massage, whatever the physician's prescription may call for. After this it will probably be nine o'clock, and the patient may take his ordinary breakfast. He should have eggs, and may have his choice as to the way they may be prepared or served—soft-boiled, poached, raw, etc., or in form of egg-nog, with sherry or whiskey. If he is accustomed to a meat breakfast, he should have broiled steak, chops, poultry, sweet-bread, etc., or raw chopped beef. Bread a day old,—preferably whole-wheat bread or French rolls, but not hot,—with plenty of butter or honey, either milk, cocoa, coffee with milk, but not too strong, or a cup of bouillon, should also form part of the meal. Whether the patient likes to have his mush (cereals) for breakfast or supper, may be left to his choice ; some fruit should always precede his eggs or meat in the morning. If fish is served in the morning it should be either broiled, boiled, or baked.

The patient should take the heartiest meal between the hours of twelve and two o'clock (four hours after his breakfast). Broths or soups should be the first course. Oysters and clams are most easily digested raw. Any kind of fresh fish may be served again at

dinner, and in any form except fried; and there will be, of course, roast meat of some kind, rare roast beef, mutton, poultry, etc. Of vegetables, spinach is particularly to be recommended on account of the large proportion of digestible and assimilable iron. Next to this in nutritive power come lentils, peas, beans, cauliflower, potatoes. Fresh vegetables should be given whenever it is possible to have them. Lettuce and other salads, preferably prepared with lemon-juice instead of with vinegar, are permitted. Light puddings, fruits, and nuts may constitute the dessert.

At about four or five o'clock some milk with toast may be taken, or, if the patient cares for it, he should have a cheese or meat sandwich. At this time the milk may be replaced by bouillon or chocolate.

The supper should not be quite as voluminous as the dinner. Cold or warm meats, rice with milk or gruel, with jellies, fruits, etc. At bed-time again a glass of milk or some milk-toast.

It is, of course, impossible to lay down an absolute rule of what to allow and what not to allow. One must consider the patient's likes and dislikes; there are idiosyncrasies for certain dishes as well as for certain medicines. I have learned to allow my patients occasionally such things as ham, smoked tongue, and even pickled or salt herring, sardines, and sardelles, and I have not yet found any occasion to regret this practice, for they seem at times to stimulate the appetite.

The kitchen should be the phthisio-therapist's pharmacy. In a sanatorium the menu should be submitted to the medical director previous to its preparation. I will give a few receipts for particularly useful dishes which I have seen served, or eaten myself, during my *voyage d'étude* in sanatoria, and have since tried with my private patients with most satisfactory results. First, I desire to describe an excellent method of preparing the raw beef, or the so-called raw Hamburg steak, for which receipt I am indebted to my distinguished teacher, Professor Grancher, of Paris:

With a knife, not too sharp, scrape the surface of the meat (rump-steak). Put the fine scrapings thus obtained in a stone or glass mortar and grind them. Then spread the mass on a sieve and press it gently with a spoon. What passes through is a meat-pulp without fibres or gristle, perfectly digestible and very nutritive. (I have found, however, that for all ordinary cases the scraped meat suffices without being ground.)

Preparing
of the raw
beef.

The supply of meat-pulp for the day may be made in the morning, but it must be kept in a cold place, as it taints easily. It is better, when possible, however, to make it fresh just before it is to be eaten. The patient may take the pulp in any way he pleases. It can be eaten plain with pepper and salt, mixed with milk, with warm bouillon, with mashed vegetables, or with sweets. The latter method will make it tempting for children. It can be rolled into balls easy to swallow, or made into sandwiches with a few anchovies or a little anchovy-paste, pickled herring, or some other relish, according to the patient's taste. The yolk of a raw egg added increases the nutritive quality of the meat-pulp. Thus it will be seen that the ways in which the raw meat may be taken are so numerous that it can be made palatable to almost any patient.

Mucilaginous soup.

To make a good mucilaginous soup, take five pounds of veal-bones and ten quarts of water or weak bouillon. Bring it to a boil and then skim. Add two pounds of barley and a little salt, cook slowly for five or six hours, and then strain off the liquid. A cupful should be taken mixed with the yolk of an egg. If the soup is too thick, dilute it with a little bouillon.

To prepare a good milk-jelly, boil two quarts of milk with a half pound of sugar for five or ten minutes. When the milk is cold add one ounce of gelatine dissolved in a cup of water, the juice of three or four lemons, and three glasses of good Bordeaux wine.

Beef essence.

It is often very convenient to have a bottle of beef-essence on hand. The following is an easy method to prepare it: Put two pounds of round-steak, cut in small pieces, into a jar without water. Place the jar, covered closely, on a trivet in a kettle of cold water. Heat gradually, and keep it not quite at the boiling-point for two hours, or till the meat is white. Strain, pressing the meat to obtain all the juice; season with salt. Or place the jar in a moderate oven for three hours. The liquid thus obtained contains all the nutritive parts of the meat. It may be kept in the refrigerator, and a small portion heated (not boiled) as wanted. Or it may be made into beef-tea by diluting with boiling water. The essence can also be given ice cold to febrile patients.

All bouillons and soups taken regularly at the principal meal stimulate the appetite and aid the digestion by stimulating the gastric secretions.

A patient who has fever should eat when his temperature is lowest, and only the most easily digested substances. All pul-

monary invalids should be taught to take their meals at regular intervals, eat slowly, and chew their food well. Everything should be resorted to to make the patients eat, for in this lies the secret of the success of the treatment. The patient should be weighed and carefully examined every month or two weeks, according to his condition, and thus the progress of the cure can be controlled. The good condition of the teeth is, of course, essential, and a well-conducted sanatorium should not be without its dental chair, and should receive the regular visits of an experienced dentist. Care of teeth.

The physician should teach his consumptives that it will increase their appetites to brush their teeth and rinse their mouths after each meal. This is seemingly a trifle, but I have found that it has helped me much in my dealings with the bad eaters among my patients. Of all preparations I give the following tooth-wash the preference:

R. Essence of peppermint,	℥ x
Oil of wintergreen,	℥ xv
Thymol,	xv
Benzoic acid,	℥ iii
Tr. of eucalyptus,	℥ i
Alcohol,	℥ xv.

M. Sig.—One-half teaspoonful to be diluted in a tumblerful of water.

This leaves a pleasant freshness in the mouth.

Opinions in regard to giving alcohol to consumptives differ very largely, and it is extremely difficult to lay down any rule on this subject. My own experience has taught me that it is indispensable in some cases, but it should be given preferably in the diluted form of wine or beer, or good cognac in small quantities mixed with milk. It should rarely be given as an antipyretic remedy. When prescribed in the form of cognac or whiskey, it should be dealt out carefully like powerful and dangerous medicine. Alcohol

This is another advantage of treating the patients in a sanatorium where they are seen several times a day. The effect of the alcohol or any other medicine can be watched. The physician of a sanatorium, seeing his patient almost constantly, will soon be able to judge whether the improvement the patient may confess to feel after taking the alcohol is physiological or pathological (intoxication).

Of the many food-substances which have been recommended recently as especially valuable in the dietetic treatment of tuberculosis, I have used most extensively and with most satisfactory results the new product, tropon. Tropon.

At the Ninth International Congress for Hygiene and Demography, held in Madrid in April, 1898, Professor Finkler, of Bonn, made his first communication on tropon, under the title of albumen nutriment.¹

Tropon is a tasteless and odorless, albuminous preparation in the form of a yellowish-brown powder, obtained through a complicated chemical process from animal and vegetable substances. Among animals, fish, and among vegetables, the lupines, which ordinarily are not suitable for the preparation of food for men, have been largely used. Tropon is supposed to represent over ninety per cent. of pure albumen. The clinical experiments made by Professor Finkler and his pupils with this substance as an adjuvant to food were surprising. The most interesting feature was that tropon was excellently well borne by patients suffering from an impaired digestion. Tropon seems to be particularly valuable on account of its small bulk and its substituting completely the albumen in other foods. That such a substance should be of value in the treatment of consumptives seemed evident. Through the courtesy of Professor Finkler I received a quantum of tropon several months ago, with which I began my experiments in feeding tuberculous patients. The results were so encouraging that I wrote for an additional supply. I selected patients with whom I had had unusual difficulty in increasing their weight, with some among them on account of their aversion to fats. To summarize the results obtained, I may say that with from one to two ounces per day the average gain in twenty days was about one pound and a half, including one case with negative results. I must, however, add that these patients were mostly ambulant. In Weicker's sanatorium in Goerbersdorf, where patients in all stages of the disease are admitted, from out of eighteen cases fifteen responded to the treatment, gaining in the average $2\frac{1}{4}$ pounds in four weeks. The relatively better results obtained in the sanatorium must be ascribed to a better supervision and a more regular administration of the tropon than is possible with ambulant patients. Tropon has since been extensively used with satisfactory results in the clinics of von Leyden and Senator in Berlin; Schmelsky and Klein in Hamburg. It can be administered with mush, thick soup, cocoa, chocolate,

¹ "Eiweissnahrung und Nahrungseiweiss," "Deutsche med. Wochenschrift," 1898, No. 17.

milk, mashed potatoes, rice, sago, tapioca, etc. It must be borne in mind that tropon is not soluble in water, and consequently falls to the bottom in clear liquids, coffee, and thin soups, and when taken with such it must be constantly stirred. It can be advantageously taken with the yolk of an egg and some sugar. For those of my ambulant patients who have not the conveniences of home life, I prescribe the tropon to be taken by the aid of a wafer (a teaspoonful at a time).

Considering that tropon is really an able substitute for the albumen in other foods, that it rarely causes digestive disturbances, that it can be taken for a long period of time without aversion, and that it is excessively cheap, we may look upon this new product as a most valuable adjuvant in the dietetic treatment of phthisical patients.

CHAPTER XVII.

SYMPTOMATIC TREATMENT OF PULMONARY TUBERCULOSIS.

The hygienic and dietetic treatment in the closed establishment, combined with careful aëro- and hydro-therapy, has been described in the preceding pages. This treatment is applicable to the average case of pulmonary tuberculosis, but there are cases in which this alone will not suffice. There are patients who present a disease with one or several symptoms more pronounced, and which will not yield to the hygienic and dietetic measures alone, or to the routine aëro- or hydro-therapeutic treatment; for these we must institute a judicious symptomatic treatment.

Malnutrition and anorexia.

A very much impaired nutrition, with a lack of assimilative power, should not be treated by forced alimentation, but by rest, at first in bed and later on the veranda; regular massage; frequent administration of small quantities of food, consisting of very easily digested substances, such as scraped or finely chopped raw beef, toast (fresh bread should never be given when there is any digestive trouble), milk pure or with egg in the form of egg-nog (two-thirds of a glass of milk, the yolks of one or two fresh eggs, one or two teaspoonfuls of good cognac or whiskey, and enough sugar to suit the taste), bouillons, soups, etc. The yolks of fresh eggs I recommend to all weak consumptives. Taken raw, beaten with a little sugar or salt, several times a day, they seem to act by their nuclein as valuable material in the reproduction of new tissue-cells. The yolks of fresh eggs will often be retained when the stomach apparently tolerates nothing else. At times the anorexia consists of a simple aversion to warm meat; in such cases no urging will help, and the best thing to do is to replace warm dishes by cold meats appetizingly served.

Some patients may be able to take a meal in the open air when, seemingly, they cannot do so in the dining-room. Though this form of anorexia is evidently of purely psychic origin, it is well to be indulgent in this respect, for nothing should be left undone to

make the pulmonary invalid eat. As has been said already, the salvation of the patient lies in good nutrition. Where there is anorexia, the cause of which cannot be determined, it will be necessary to change the menu often. Have the patient eat little at the time until he and his physician have discovered something which may serve as a stand-by in the dietetic treatment of the disease. To build up the system cod-liver oil may be given whenever the stomach can support it. A good method for its administration is that of Bricemoret, which is to mix it as follows:

R. Cod-liver oil,	12 fluidounces
Syrup of tolu,	6 fluidounces
Tincture of tolu,	12 drops
Oil of cloves,	2 drops.

At the moment of administration the mixture is to be well shaken, and a tablespoonful taken two or three times daily. Taken thus, the taste of the aromatic syrup only remains after the ingestion of the oil. In younger subjects and children, cod-liver oil seems to have a particularly gratifying action.

The various malt preparations, as maltzyme, malt-extract, and maltine, may be given with benefit in either the pure state or combined with cod-liver oil or hypophosphites. Next in efficacy come the arsenical preparations, the strychnias, the irons (ferratine is especially well borne by phthisical invalids), and the phosphates.

Iodoform has given much satisfaction in the hands of many phthisio-therapeutists such as Flick,¹ Daremberg,² Ransom,³ de Renzi.⁴ It has been recommended for nearly all degrees of phthisis, and given as inhalation in the form of one part of iodoform to ten parts of ether (twenty minims of the mixture for each inhalation with respirator-inhaler). It is administered as pills, according to the following formula:

R. Iodoform,	gr. iss	Iodoform.
Codeine,	gr. $\frac{1}{3}$	
Ext. cascara,	gr. $\frac{1}{2}$	
M. et ft. pil. j.		

¹ Flick, "A Further Report on the Treatment of Tuberculosis by Iodoform Inunctions," "The Medical News," March 2, 1892.

² Daremberg, "Traitement de la Phtisie Pulmonaire," Paris, 1893.

³ Ransom, "The Treatment of Phthisis," London, 1896.

⁴ De Renzi, Naples, "The Lancet," December, 1897.

Flick gives iodoform as an inunction. De Renzi's method of its administration is especially recommendable. If the patient is suffering from diarrhoea he gives the following prescription :

R. Iodoform, gr. xxx
 Tannin, gr. lx.
 M. and divide into forty cachets.
 From two to four cachets daily.

If there is a tendency toward constipation, Professor de Renzi replaces the tannin by naphthalin.

Creosote,
 guaiacol,
 etc.

The various modern preparations of creosote and guaiacol seem in most cases, when given in small doses, to exert a favorable influence on the general condition of the patient. I prefer to give the creosote in milk, beginning with two or three drops thrice daily, gradually increasing to about twenty-five drops per day. The moment there is the slightest digestive disturbance I stop the creosote; and if I then find that the patient does as well without as with it, I do not recommence its administration again. In order to protect the consumptive invalid as far as possible from his greatest foe, dyspepsia, I follow this rule with all medicinal remedies, new or old.

The creosotal (creosote-carbonate) is seemingly more easily borne than the creosote. It has been strongly recommended by von Leyden, of Berlin, and at the last Congress for the Study of Tuberculosis in Paris Dr. S. de Planzoles submitted a very favorable report on its use in nearly all stages of pulmonary tuberculosis. The creosotal contains ninety per cent. of its weight of pure creosote. It can be taken pure or as an emulsion with the yolk of an egg, with milk, or with cod-liver oil. For an adult fifty to sixty minims may be given two or three times daily; this should, however, be considered a maximum dose. It is best in all cases to begin with small doses, as, for example, five to ten drops per diem; then gradually increase and return again to smaller doses.

According to Stubbett's report,¹ of 1898, ichthyol prepared as enteric pills, two grains each (three to fifteen per day), has been used with considerable success at the Liberty Sanitarium.

Guaiacol has also found favor with some phthisio-therapeutists as a valuable remedy in tuberculosis. It has the advantage over

¹ "Sanitarium Treatment of Pulmonary Tuberculosis," "St. Louis Med. Gazette," December, 1898.

creosote that it is less irritating and that it deranges the digestion more rarely than the former. It is best given diluted with milk, beginning with five drops three times daily, gradually increasing this dose to fifteen. The patients who have too great a dislike for its peculiar and unpleasant odor can sometimes be induced to take guaiacol in capsules. Goldmann, in the "Riforma Medica" of December 22, 1898, recommends guaiacol and ichthyol in the following combination:

- R. Carbonate of guaiacol,
Sulphichthyolate of ammonium, of each 225 grains
Pure glycerine, 600 minims
Peppermint-water, 150 minims.
M. Twenty to thirty drops to be taken daily.

If even the guaiacol is not well tolerated by the stomach, Bouteron's¹ guaiacol enema or suppositories may be advantageously applied:

- R. Guaiacol (in crystals melted at a low temperature), . . gr. v-xv
Olive oil, 3 iss-3 ij.
Inject at a temperature of about 90° F.
R. Guaiacol, gr. vj-xv
Cocoa-butter, 3 ij.
For two suppositories, to be applied within twenty-four hours.

Ordinary salt has often been of value to me as an alterant in the treatment of pulmonary tuberculosis. While it may be given in solution as an inhalation, it is most easily and effectually administered in large doses with the consumptive's daily meals. Drozda² ascribes to chloride of sodium a remarkably stimulating and eliminating effect on the pulmonary secretions. Besides this, I have no doubt that the ingestion of large quantities of salt aid to quite a considerable degree in the calcareous transformation of tuberculous lesions.

Dimitropol's intense mineralization³ should also be mentioned here as analogous to the chloride of sodium treatment. The following is his method of administration of chloride or phosphate of sodium or the tribasic phosphate of calcium. The patient is

¹ "Presse Médicale," 1899, No. 13.

² Drozda, "Grundzüge einer rationellen Phthisiotherapie," XII. Internationaler Congress.

³ "Gazette hebdomadaire de médecine et chirurgie," July 17, 1898.

given, daily, for thirty or forty days, each morning, a nutritive mixture composed thus:

R. Yolks of eggs,	4 or 5 in number
Pepsin,	15 grains
Hot milk,	12½ ounces;

the whole being well beaten up for five minutes and flavored, according to taste, with a little vanilla.

Ten minutes later a slice of bread and butter, well salted to the extent of at least half a teaspoonful of kitchen-salt, is given. When the patients are very wasted, there should be administered, in addition, nutrient enemata composed as follows:

R. Yolks of eggs,	4 in number
Liquid peptone,	375 grains
Chloride of sodium,	75 grains
Hot concentrated bouillon,	1200-1500 grains.

This enema, well beaten up, should be slowly introduced by means of an irrigator. Each enema should be preceded by an evacuating enema. The patient also takes, daily, from ninety to one hundred and eighty grains of tribasic phosphate of calcium and from thirty to sixty grains of phosphate of sodium, as in the following formula:

R. Tribasic phosphate of calcium,	30 grains
Phosphate of sodium,	7½ grains;

in each powder. From three to six daily.

After each meal there is given, in half a glass of water, from two to four teaspoonfuls of hydro-chlorophosphate of calcium in ten per cent. solution.

All the drugs enumerated should be administered first in smaller doses, increasing gradually for forty days; toward the end of this time it is necessary to diminish the doses, to continue with smaller doses for six months, and to recommence later with intermissions as may be deemed necessary, guided by the tolerance of the patient.

Further, there is prescribed daily, for thirty or forty days, two hundred and twenty-five grains of common salt mixed with food already salted in the ordinary culinary preparation. It is necessary for the patients to take, indefinitely, from ninety to one hundred and twenty grains of salt daily.

Besides this treatment Dimitropol administers, daily, eighteen ounces of meat, a quart of milk, three eggs prepared to the patient's taste, fish and fresh vegetables in habitual quantity.

Wherever there is a great difficulty in nourishing the patient, it seems to me that this treatment is well worth trying. Of course, a patient submitted to the ingestion of such large quantities of salt should be closely watched; for, doubtlessly, there will be individuals who cannot take half the quantity of salt prescribed without intestinal disturbances.

The old idea of ingestion of the fresh blood of bullocks as an anti-phthisical remedy has been recently revived by Dr. Whittaker.¹ He, however, recommends it administered in form of enemata. To each quart of blood he adds half an ounce of bicarbonate of sodium and sugar of milk and one grain of common salt. Two pints of a mixture consisting of equal parts of water and blood are thrown high up in the rectum. Dr. Whittaker has found marked increase in weight and gain in nutrition to follow the repeated use of such blood-enemata in tuberculosis.

As a general tonic the following composition has given me much satisfaction:

R. Tinct. nucis vomicæ, ℥ij
 Tinct. cinchonæ,
 Tinct. calumbæ, aa ℥j
 Tinct. gentianæ, q. s. ad ℥iv.
 M. SIG.—One teaspoonful in a little water before each meal.

A milk diet often helps to bridge over a period of anorexia; but some people can not or will not take milk. Raw eggs stirred into substantial soups may be made to take its place. Koumiss (fermented mares' or cows' milk) is also a most valuable substitute whenever there is an aversion to milk in its natural state. In absolute anorexia one must endeavor to find out the cause by an analysis of the gastric juice, and direct the medication accordingly. A good preparation for excessive acidity of the stomach is five grains each of bismuth, bicarbonate of sodium, salol, or benzonaphthol, to be taken before meals. Not infrequently, however, this hyperacidity seems to be of a purely nervous origin, and persuasion and suggestion or electricity will prove the best remedies. In undetermined troubles, to wash out the stomach a

¹ "Practitioner"; "Canada Lancet," January, 1899.

Débove's
meat-
powder.

few times often gives relief. At times, however, it may become necessary, in order to convince the patient of his digestive power or not to let him starve, to resort to Débove's method of tube-feeding.¹ His *poudre alimentaire*, or meat-powder, is prepared in the following manner: Beef is taken and all the fat possible removed, and also the tendons. It is hashed rather coarsely and spread on plates, to be dried in an oven at a temperature of 194° F. When the meat has dried hard, it is ground in a mortar and then strained through a fine-silk sieve. The powder thus obtained is impalpable and will keep indefinitely if preserved from dampness. It represents four times the weight of fresh meat. The best vehicle for the introduction of meat-powder is bouillon, to which may be added the whites and the yolks of two eggs, previously beaten.

Dilatation
of the
stomach.

Diarrhœa.

Other digestive troubles may often be successfully treated by simple and careful dieting and the judicious administration of pepsin or pancreatic preparations. Dilatation of the stomach, for example, often yields rapidly to the dry diet so highly recommended by Bouchard, of Paris. Acute attacks of diarrhœa, if not due to tuberculous intestinal lesions, are best treated by first cleansing the intestinal canal and then giving the patient appropriate food, such as cocoa, toast, eggs, rice, mucilaginous soup, and Bordeaux wine with arrowroot. If the diarrhœa is due to tuberculous intestinal lesions, the case is more difficult. Mere diet does not suffice to stop it, and even large doses of opium and bismuth have no lasting effect. Hot claret with cinnamon, also tannic or gallic acid in large doses, sometimes give more lasting relief. As a medicinal remedy for chronic diarrhœa in tuberculosis, Dr. de Renzi's combination of tannin and iodoform, as cited above when speaking of iodoform, should be recalled.

Phthisical patients suffering from frequent diarrhœa should keep the abdomen warmly covered. They should avoid such articles of food as cabbage, salads, sweetmeats, or substances which their experience has taught them tend to increase the frequency of stools. They should adhere strictly to the anti-diarrhœic diet just described for acute attacks. In the severer forms of diarrhœa, absolute rest in bed must be insisted upon.

It should be impressed upon the patient that his bowels must

¹ Débove, M., "Recherches sur l'Alimentation artificielle, la Suralimentation," etc. Communication faite à la Société méd. des Hôpitaux. Séance du 14 Avril, 1882.

move freely once every day. Any tendency to constipation he should at once report to the physician. Great effort during the act of defecation may bring about a severe hæmoptysis or cause the development of hemorrhoids. Carlsbad salt and the California cascara sagrada are favorite remedies in the European sanatoria when prunes and other fruits are of no avail. For the more obstinate forms of constipation in fairly strong patients the judicious administration of hydrargyrum chloridum mite—as, for example, ten grains in fractional doses of one grain every hour, with the sugar of milk as vehicle—renders often valuable services. Not to weaken the patient unnecessarily I have him stop the calomel powders the moment he has had a free evacuation, which in many cases is effected by the fifth or sixth dose. I do not favor too frequent enemata: they tend to lessen the contractile power of the large intestines. At times a glycerine suppository will do the work of an evacuating enema. If the constipation takes a chronic character, abdominal massage is usually resorted to with good results. The application of the wet-pack over the abdominal cavity for a few hours, followed by a gentle friction with alcohol, also rarely fails to help.

Painful coughs seem best relieved by small, repeated doses of codeine in solution, but the dry cough, which is often the result of habit, and where there is really nothing to expectorate, should be suppressed by discipline. Dettweiler tells his patients that to cough in public without cause is scratching the throat because it tickles, and that it is as ill-mannered as scratching one's head in public when it itches. Sips of cold water, orange-juice, or milk, small pieces of ice or tablets of Iceland moss (*cetraria*), will help to overcome tickling sensations in the throat until the patient has fully become master of the cough. Holding the breath for a few seconds will often help also. It is really wonderful how much it is possible to accomplish in this respect by discipline. In Falkenstein I have dined for weeks with a hundred and more consumptives in one large dining-hall, and it was a rare occurrence to hear a single cough during the dinner-hour.

To relieve the not infrequent morning attacks of coughing, a glass of hot water with some lemon-juice, with but little or no sugar, or with five to ten drops of the ammoniated spirit of anise (liquor ammonii anisatus), often suffices. Occasionally, it becomes absolutely necessary to give expectorants regularly to relieve a

distressing cough and the tenacious expectoration. The following prescription has rendered me good service in most such cases :

R. Codeinæ, gr. vj-viii
 Acidi sulphurici diluti, f ʒ iss
 Glycerini,
 Aquæ laurocerasi, aa f ʒ j
 Syr. pruni virginianæ, f ʒ ij
 Syr. tolutani, q. s. ad f ʒ vj.

M. SIG.—A teaspoonful whenever the cough becomes distressing; more than six teaspoonfuls should, as a rule, not be taken in twenty-four hours.

At times I change this prescription for Murrell's cough-mixture, which is also very good. It is as follows :

R. Codeinæ, gr. iv
 Acid. hydrochlor. dil., ℥ xxx
 Spirit. chloroformi, ʒ iss
 Syrup. limonis, ʒ j
 Aquæ, q. s. ad ʒ iv.

M. SIG.—One teaspoonful as occasion demands.

In a number of cases I have tried the new remedy, heroin, recommended by Dreser and Floret in the "Therapeutische Monatshefte" of September, 1898, and by Manges in the "New York Medical Journal" of November 26, 1898. It has given satisfaction in quite a number of cases, relieving dyspnoic sensation and seemingly allaying the irritating cough. I have given it in tablet form as well as in solution, but in smaller doses, as recommended by Manges. One-sixth to $\frac{1}{10}$ of a grain, taken several times during the day, seems to render the patient drowsy and sleepy. I give $\frac{1}{16}$ to $\frac{1}{20}$ of a grain, preferably in solution. I have found diluted sulphuric acid just as good a solvent as acetic acid, recommended by Manges. To replace the codeine by three grains of heroin in the six ounces of cough-mixture given above will render good service. When the cough does not yield to these medications, or when there is a marked bronchorrhœa, daily intratracheal injections of twenty minims of the following liquid often give relief:

Bronchor-
rhœa.

R. Guaiacol,
 Menthol, aa ℥ x
 Ol. oliv., ʒ j.

If violent coughing spells cannot be repressed, to tie a wide flannel band around the chest will lessen the painful concussions.

Vomiting in consumptives is relatively seldom due to digestive troubles, but is usually due to the reflex action brought about by coughing spells. So, if digestive derangements can be excluded, to keep absolutely quiet after eating and control approaching attacks of coughing as above indicated, will prove the best remedies.

Besides the pains in the side, of which we will speak in connection with pleurisy, tuberculous patients suffer intensely at times from intercostal neuralgia. Hot-water compresses, frequently repeated, or the heating compress, which differs from the chest compress described on page 254 by placing between the linen and the flannel some oil-silk or other impermeable material, will render good service. When the suffering becomes unbearable in spite of local applications, the subcutaneous injection of $\frac{1}{8}$ of a grain of morphine at the seat of pain should be given. But before I resort to opiates I invariably try a counter-irritant. It often gives instant relief, and is of value in nearly all the stages of the disease. The counter-irritants seem to draw from the delicate respiratory and circulatory organs countless dangerous micro-organisms into the less delicate cellular tissue, where by the action of these irritants the number of the phagocytic white corpuscles has been increased; thus an actual destruction of pathogenic microbes is brought about by the simple mustard plaster, the old-fashioned dry-cups, or the "points de feu" (ignipuncture).

Counter-irritants as a means of producing revulsion in chronic pulmonary tuberculosis have become of late somewhat out of use, especially in this country. I fear their therapeutic value has been underestimated in the eager search for something specific. In France, counter-irritants are yet quite extensively resorted to, especially in hospital practice. In the "Archives Cliniques de Bordeaux," Arnozan has recently taken up the study of the influence on the kidneys of the application of cantharidized blisters to the thorax. The patients selected were only those with normal urine. The latter was again tested after the application of the blister and it had remained normal; no other inconveniences were observed in any case. As a result of these observations, Professor Arnozan agrees with Professor Grancher, of Paris, that small blisters applied repeatedly are one of the best means of arresting the progress of chronic pulmonary tuberculosis, although if the urine proves abnormal in preliminary examination, some other "revulsive" than

cantharides should be employed. Whenever a strong revulsion is indicated, and the patient's fear of the hot iron can be overcome, I give ignipuncture the preference, it being the cleaner and safer "revulsive." After its application I sprinkle over the respective region some inert powder as a protective.

Hyperhidrosis.

To prevent night-sweats the patient should take a glass of cold milk with a little cognac before retiring; he should never retire hungry, and should always have some light lunch on a table near his bed, so that he may eat something if he wakes in the night feeling faint. Again, if the patient is in the habit of waking up at a certain hour in the morning bathed in perspiration, he should be waked two hours earlier and given egg-nog or another light lunch. Sometimes it will be necessary to give him a sponging off with water and vinegar, or water and lemon-juice, and the administration of atropine, agaricine, etc., also may be indicated. But once, when all remedies had failed, I resorted to the following hydrotherapeutic procedure, which worked so well that I now prescribe it in most cases of severe hyperhidrosis, before experimenting much with medicinal agents: Several thicknesses of rather coarse linen, folded in the form of a shawl, or, better yet, three different cloths,—one narrow one for each apex like a broad shoulder-strap, and another wider one to wrap around the chest,—are soaked in water at a temperature of about 55° F., wrung out and then closely applied over the apices and around the thorax. A thick flannel band, somewhat wider than the compress, is wrapped over this, and the whole is fastened in place and remains thus all night. The patient usually feels no discomfort, sleeps well, and sweats but slightly, if at all. In the morning the compress is removed and the chest and shoulders are rubbed thoroughly dry. If the consumptive is relatively strong and experience has demonstrated to the attending physician that an occasional sweat-bath does not exhaust the patient too much, and, on the contrary, lowers his temperature and improves his general condition, this method of combating a hyperhidrosis is perfectly justified. Through the sweat-bath the excretory action of the skin is considerably increased and a larger quantity of toxine thus more rapidly eliminated.

Pulmonary hemorrhage is one of the most important symptoms to be considered in the treatment of consumption. We cannot here enter into the pathological significance of the various types

and degrees of hemoptysis, from almost imperceptible bloody expectoration to a profuse flow of bright-red or dark-colored blood, at times from mouth and nose at once. When called to see a patient with a considerable hemorrhage, it is not always easy to say whether it is due to a congestive or an ulcerative process, and I really do not think that the treatment can differ very much. In profuse bleeding, absolute rest is the all-important indication. The patient is not allowed to talk and should be placed in a semi-recumbent position. He should be enjoined to refrain from an attempt to hold back the flow of blood. Suffocation or ensuing pneumonia is to be feared when such attempts are made. All persons not needed in the room should leave, and everything should be kept as quiet as possible. The physician will have at his disposal four important remedies,—viz., morphine, ergotine, atropine, and hydrastis canadensis,—all of which he may need before being able to obtain a stoppage of the flow of blood. Starke¹ and Solly recommend the hypodermic injection of large doses of atropine ($\frac{1}{50}$ of a grain) in all serious cases, particularly in those in which ergot has proved a failure. Nitroglycerine in one-half-drop doses of one per cent. alcoholic solution every half-hour has, in the hands of Dr. Flick, of Philadelphia, rendered excellent services as a hemostatic in hemoptysis.² In the meantime the patient is given small pieces of ice or small sips of ice-water.

To give the assurance that a pulmonary hemorrhage is in itself not by any means a symptom necessarily dangerous to life, and still less excluding the possibility of a good recovery, will have the best effect on the usually much alarmed patient. Right here I wish to say that I think Wolff's³ policy, to tell all patients, even if they never had a hemorrhage, of the possibility of this occurrence, will have, as far as mental agitation and excitement are concerned, a most prophylactic effect. Especially will this be so when the warning is accompanied by the assurance that pulmonary hemorrhages are one of the phases rarely absent in the development of the disease, and are symptoms which, while needing careful attention, are not more dangerous than many

¹ Starke, "Phthisis," "Dietetic and Hygienic Gazette," March, 1899.

² "Philadelphia Med. Journal," Feb. 19, 1898.

³ Wolff, "Die moderne Behandlung der Lungenschwindsucht," Wiesbaden, 1894.

others. After the injection of morphine or ergotine or atropine or the administration of *hydrastis canadensis*, bags of morseled ice may be placed over the pectoral region of the apices. But since ice may not always be had when it is most urgently needed, and the weight of the bag becomes sometimes oppressive to the patient, the following method of applying cold water when in presence of hemorrhage of the lung is, I think, well worth remembering. It was, I believe, first instituted by Winternitz. One procures the water as cold as possible and soaks in it a part of a sheet or a piece of rather coarse linen. When rung out so that it does not drip, the cloth is folded in the shape of a triangle, placed closely over the patient's chest, and is pressed into the supraclavicular spaces. The apex of the triangle reaches over the pit of the stomach and the base touches the neck. Whenever the compress becomes warm it can be rapidly changed without disturbing the patient's position. The cooler and more frequent the application, the more rapid is the action of the vaso-constrictors.

When the shock from the hemorrhage has been very severe a hypodermic injection of ether, digitaline, or caffeine is well indicated. I should also suggest in cases of severe shock, as a result of a profused hemoptysis, Kemp's new method¹ of recto-irrigation with hot salt solutions (one teaspoonful of chloride of sodium to a quart of water at a temperature of 100° to 120° F.) by the aid of his double catheter. The warmth thus conveyed to the body, and, in addition, the absorption of the saline solution, will help to bring about a favorable reaction. The irrigation can be kept up for an hour or more without the patient being inconvenienced. Brannan² recommends aconite as a direct cardiac sedative. According to the experiments of Andrew³ it produces a fall in the pressure in the pulmonary artery.

Ligation
of limbs.

Of the physical means to control pulmonary hemorrhages I desire yet to mention the sometimes very useful ligation of lower and upper limbs to prevent, in a measure, the blood from returning to the lungs. During my visits to the European sanatoria I saw some very elaborate and expensive instruments devised for that

¹ Kemp, "Intestinal Hydrotherapy," "Transact. of N. Y. Academy of Medicine," Feb. 3, 1898.

² Brannan, J. W., "The Treatment of Pulmonary Hemorrhage," "N. Y. Med. Journal," vol. 1, p. 218.

³ Andrew, Harvican lectures; "British Med. Journal," 1890, vol. 11, p. 942.

purpose (Assalinische Schnallen), but any flannel band, muffler, or large handkerchief will answer the purpose just as well. These ligations of arms or legs are made as near the trunk as possible, and just tight enough to hinder the return of the venous flow, but not to compress the arterial pulse. Every half-hour or so the bands should be loosened, provided a too painful compression of some nerves or a threatening anæmia of the brain does not demand an earlier removal of the ligatures. Under ordinary circumstances these constricting bands can be renewed after short intervals and as often as the condition of the patient may indicate. A hot-water bag should, at the same time, be placed at the feet.

After the stoppage of an acute hemorrhage, the administration ^{After-treatment.} of astringents, such as the fluid extract of ergot, or, better yet, gallic acid in ten-grain doses, and of iced drinks, must, of course, be continued for some time. Cold diet, liquid or semi-liquid, should also be insisted on for a while after acute attacks. The meals should be small but frequent, to attract the blood to the alimentary canal. The patient should also be instructed to refrain from coughing violently, to avoid a renewal of the hemorrhage.

Lastly, I wish to speak of the value of deep, quiet respirations; ^{Value of deep breathing.} of course, without any extra effort or movement of the arms. When instituted an hour or so after the acute attack has subsided, two or three deep respirations every thirty or sixty seconds will hasten the complete cessation of the bloody expectorations which have so frequently a tendency to become chronic. It is often the custom to continue the absolute rest necessary during the acute attack too long. I see in this habit a certain danger of hypostasis; in fact, I think we should permit a patient to leave the bed or couch a few days after the cessation of the hemorrhage to take short walks, according to his strength, around the room or on the veranda.

It goes without saying that those patients whose bloody expectoration is of a distinct chronic character, and where the congestive origin is evident and the general condition is relatively good, should rather be, as much as possible, out-of-doors; and for them respiratory exercises are of special value. No less an authority than the great immortal Traube instituted this mode of treatment for chronic hemoptysis due to congestion of the respiratory organs. For the same class of patients the pneumatic-cabinet treatment, persistently carried out, is most valuable in arresting chronic pulmonary hem-

orrhages. The repeated but careful administration of saline cathartics also renders good service in relieving the thoracic organs of their congestion.

Hemophilic diathesis.

All phthisio-therapeutists will occasionally meet with patients having frequent pulmonary hemorrhages which are not at all in correspondence with the relatively small tuberculous lesion which the stethoscopic examination reveals. The only explanation in such cases is a hemophilic diathesis. A few times I have found myself in the presence of such cases. The usual anti-hemorrhagic remedies having failed, I resorted to a well-known remedy which we are apt to prescribe if we know of nothing better. I employed the iodide of potassium to combat the hemorrhagic diathesis, hoping, if possible, to overcome through this alterant the fragility of the blood-vessels. I gave the saturated solution of iodide of potassium at first in five-drop doses in milk, raising the dose gradually to fifteen drops three times daily (forty-five grains in twenty-four hours). In none of my cases could I discover a syphilitic history. Still, the result of this treatment was most satisfactory. The intervals between the hemorrhages became longer, and the quantity of expectorated blood smaller.

Of fever in general.

To combat fever in pulmonary tuberculosis requires close study and observation. There is the chronic type and the acute type. We will speak first of the most frequent—the chronic form.

Some phthisio-therapeutists recommend to have the temperature of their ambulant or non-ambulant patients taken by the invalid himself every two hours. I do not approve of this method, for, to my mind, it has a tendency with many patients to increase uselessly their anxiety and, *ipso facto*, their temperature. Non-ambulant febrile patients should never be allowed to take their own temperature; in fact, the nurse who attends to this should use all possible tact not to reveal to the patient any marked elevation. Mercier's or other so-called automatic thermometers will be of good use with this class of patients. It seems to me that, even with a patient seriously ill, to take the temperature at about eight o'clock in the morning, and about one and five o'clock in the afternoon, and at nine o'clock in the evening, would suffice as guidance to the physician in his antipyretic treatment. In milder cases, taking the temperature at about nine in the morning and five in the afternoon will be usually all that is needed. In all severer

cases the nurse should take the rectal temperature; this method is less trying to the patient and more exact.

As to the therapeutic means at our disposal, we will divide them into five classes: prophylactic, physical, dietetic, general medicinal, and bacterio-medicinal.

Prophylactic.—A febrile patient arriving at a sanatorium, hospital, or health resort, should be put to bed, or at least enjoined to take absolute rest on a reclining-chair in the open air or in a well-ventilated room, according to the degree of the fever. In private practice, where the patient cannot be constantly observed, he should be warned, even if only in the incipient state or on the way to recovery, to avoid climbing many stairs, or other temperature-increasing physical exercise, late dinners, theatres, and all exciting amusements. Even the reading of exciting novels can produce an elevation of temperature in a tuberculous invalid.

Physical.—The physical means at our disposal to combat the pyretic condition in pulmonary tuberculosis are numerous. Here, again, rest stands first, and, above all, rest in bed in well-ventilated rooms. Turban showed to the Congress for Internal Medicine, held at Munich in 1895, a number of fever charts of his phthisical patients, in whom he succeeded in reducing the temperature to normal by prolonged uninterrupted rest in bed. Next in importance comes the rest cure in the reclining-chair in the open air; the details of this procedure we have already described in the chapter on aërotherapeutics.

As the next most important physical means to reduce temperature comes water, administered internally, pure or in the form of lemonades; externally, tepid, cold, or in form of ice. The most pleasing of all antipyretic drinks are lemon or orange lemonades. The best method to prepare them is as follows: Take three table-spoonfuls of lemon- or orange-juice and half of the peelings of one lemon or orange; pour over this ten ounces of hot water; before putting the lemonade away to cool off, remove the peels; add a few spoonfuls of sugar to suit the taste.

The external application of water as an antipyretic remedy is most important. As a rule, we may say, the weaker the patient and the higher the temperature, the more decidedly tepid should the water be (68° to 78° F.). For the average patient sponging off—first partial, then entire—with water varying from 55° to 65° F. is indicated. With timid patients the sponging off should always

Prophylactic treatment of fever.

Physical means to combat a fever, aërotherapy, hydrotherapy, etc.

be gradual and partial at the beginning, and in the following order: Hands, forearms, face, throat, neck, armpits, arms, back, stomach, gluteal regions; finally, the lower extremities from the hips downward. This order of procedure has been given by no less an authority than Winternitz.¹ This sponging off should be done under cover, and with as little exposure to the air as possible. Each portion, after being sponged off, should be rapidly covered without being dried, so that the water, through its evaporation, adds to the cooling effect. The effect of the first application will be a guidance to the physician for further procedures. This method of applying the cold water can be repeated three or four times daily until a perceptible reduction in the temperature is attained. In the use of wet-packs the same gradual procedure and the same care as to the temperature should be exercised. I do not favor the entire enveloping of a phthisical patient in a cold sheet, but prefer the partial application of compresses in the reduction of temperature to either lower or upper extremities, or the compress over the chest, which has been described more fully on page 254, when speaking of the treatment of hyperhidrosis. I resort to this especially when the sponging off seems to disturb the patient too much. I apply, for example, the wet-pack first for a while to the lower extremities; next to the upper, and so on alternately every half-hour. The wet-pack can be also improvised with the aid of a couple of ordinary towels as pack and a few larger Turkish towels as cover. When the temperature is very high an ice-bag over the heart will render excellent service; but still better would be the application of a coil of rubber tubing over the head or over the heart. The water can be made as cold as desired, and the rubber coil is not nearly as heavy as the ice-bag and more easily applied.

Dietetic
treatment
of fever.

Dietetic.—This treatment in fever is, of course, important. We have touched already on the subject in speaking of diet in general, and there mentioned that the febrile patient should eat when his temperature is lowest. When the fever is not excessively high, these patients eat often with more appetite on their reclining-chairs on the veranda, where it is quiet, than in the dining-room, where they perhaps cannot eat with the same ease and comfort. Cold

¹ Winternitz, "Zur Pathologie und Hydrotherapie der Lungenphthisie," Leipzig und Wien, 1887.

dishes are, of course, also more apropos than hot ones for any fever patient. Cold milk will constitute an important factor in the nutrition of febrile consumptives, especially when they are confined to bed. Other drinks of the nourishing kind which should be permitted are light beers and moderately alcoholic wines largely diluted with water. There are also iced barley-water and milk-lemonade, which are to be recommended. Here is the receipt for the latter: Have in readiness 2 ounces of sugar, 5 ounces of boiled milk, half a lemon or 2 ounces of white wine, 5 ounces of boiling water, and the fine peelings of half a lemon. Pour the boiling water over the peeling and the sugar, let this cool off, and then add to it the milk and the lemon-juice or the wine, and strain the mixture after ten minutes.

General Medicinal.—The antipyretic medicinal substances at our disposal I will name in the order of their seeming efficacy to reduce the temperature, at the same time doing the least harm to the patient:

Lactophenin,	5 to 10 grains, 1 to 3 times daily.
Phenacetine,	3 " 5 " 1 " 3 " "
Antifebrine,	3 " 5 " 1 " 3 " "
Antipyrine,	10 " 15 " 1 " 3 " "

In the administration of any of these four substances just mentioned, it should be remembered that they should not be given as a means of lowering the temperature, but rather to prevent the temperature from rising. I found Daremberg's method¹ in this matter a good precept to follow. If the fever commences at two o'clock and declines toward seven in the evening, and by five o'clock it has not risen over 100° F., Daremberg gives about ten grains of antipyrine at half past three o'clock in the afternoon of the following day. If the temperature at three o'clock has already attained 100° F., he gives the following day ten grains of antipyrine at noon and the same dose at three o'clock. If the temperature at three o'clock is 102°, he increases the two doses to fifteen grains each. As above mentioned, I prefer to give the lactophenin or phenacetine in corresponding doses in place of the antipyrine. If any of these remedies cause too much digestive disturbance, they should be administered per rectum. Quinine in large doses is of little avail

¹ Daremberg, "Traitement de la Phthisie Pulmonaire," vol. II.

in the chronic fever of tuberculosis. But in some cases the small doses—for example, two grains, several times repeated during the day—act quite favorably. Quinine in larger doses seems to be of more value in the acute exasperations, characterized by high temperature and the suddenness of the onset.

Bacterio-
medicinal
treatment;
antistreptococ-
cic serum.

Bacterio-medicinal.—One of the most surprising things to me which I noticed in my studies of the sanatorium treatment, especially in institutions situated in higher altitude was the almost total cessation of the fever of many of the newly arrived consumptives after a few days, without the administration of any antipyretic whatsoever. The only explanation to me was the almost total absence of pathogenic microbes, especially the streptococci, in these higher altitudes, and consequently a cessation of the association of microbes. This conclusion led me to my experiments with Marmoreck's antistreptococcic serum.¹ I wrote to the Pasteur Institute, and received my first lot of serum in June, 1896. Through the courtesy of my distinguished teacher, Professor Biggs, I was allowed to test the antistreptococcic action in the New York City Laboratory by a series of experiments on animals. I was fortunate enough to procure a virulent streptococcic culture for that purpose. These experiments proved to me that Marmoreck's claims for his serum in streptococcic infection had a good deal of justification. Being convinced of the absolute harmlessness of the preparation, I began treating tuberculous patients with fever of evident septic type where the bacteriological examination had revealed the presence of an association of the tubercle bacilli with the streptococci. The injections were made under strictest antiseptic precaution, rendering surgically clean the portion of the skin selected for the penetration of the needle, and afterward carefully covering the wound made by the large, previously sterilized serum-needle with iodoform collodion. I injected mainly in the anterior portion of the thigh or arm, and always slowly, into the deep cellular or muscular structure (some patients being very thin, this was, of course, absolutely necessary). There never was any local reaction.

I will briefly summarize the results I obtained at that time and in the subsequent clinical experience I have had with this serum.

¹ Marmoreck, "Le Streptocoque et le Serum Antistreptococcique," "Annales de l'Institut Pasteur," July, 1895.

The action of the serum was not always uniform. With patients whose temperature rose above $102\frac{1}{2}^{\circ}$ F. for several days I did not obtain any results. When, however, there was a temperature of only $101\frac{1}{2}^{\circ}$ F. or a trifle over, with streptococci in the sputum, a first injection of 10 c.c. reduced the temperature from 1° to $1\frac{1}{2}^{\circ}$. A second of 10 c.c. brought it down to nearly normal. A third, fourth, fifth, and sixth of 5 c.c. each, given first every twenty-four hours, then at longer intervals, helped to maintain the normal, or nearly normal, temperature, and a general better feeling was experienced by the patient.

Dr. Edward J. Bermingham, who used some of the same serum, which was sent to me at various times from Paris, kindly reported to me four cases. All were typical cases of mixed infection, with streptococci as the main companion of the tubercle bacilli. In case 1, 10 c.c. of Marmoreck's serum reduced the temperature from $103\frac{1}{2}^{\circ}$ to $101\frac{1}{2}^{\circ}$; this had to be repeated three times at intervals of three weeks. Case 2: the temperature rose daily to 103° ; after one injection of 10 c.c. of Marmoreck's serum the temperature did not go above 101° daily for four months. The disease then progressed rapidly and the patient died in three weeks. Case 3: the temperature rose daily to 103° or 105° ; injections of 10 c.c. and 15 c.c. of the serum were given without effect; 20 c.c. brought down the temperature to 102° , where it remained for six months, when patient left the city. Case 4: the temperature rose daily to 103° ; one injection of 10 c.c. brought the temperature down to $99\frac{1}{2}^{\circ}$, where it remained for six months; it rose again to its former height and a new injection reduced it to 100° and has not risen since—a period of seven months.

Stubbert, who experimented extensively at the Liberty Sanatorium with Marmoreck's antistreptococcic serum, reports 10 cases in the "St. Louis Medical Gazette" of December, 1898. Of these, 6 improved and streptococci were no longer found after the injections; 2 improved, but the streptococci returned, and in 2 cases the antistreptococcic injections had no effect whatsoever, though in 1 three and in the other eight injections of 10 c.c. were given.

Dr. Weaver, of Chicago, reported still better results.¹ Among other cases he cites one, in the "Journal of the American Medical Association" of September 5, 1896, with a temperature of 105° F.,

¹ Weaver, W. H., "Antistreptococcic Serum in the Treatment of Consumption."

which he brought down to nearly normal with a single dose and maintained it there by repeating the injection every second day. However, I think it will require much more experimentation to fix the real value of this serum. Its action seems to depend not only upon the make of serum used,¹ but also upon the variety of streptococci² in the system and the degree of virulence of the toxins produced by them. The earlier the injections are made, the better seem the results. I should encourage its use in pulmonary tuberculosis whenever there is a mixed infection, and when, after a short trial, absolute rest, fresh air, and the usual antipyretics, including the judicious application of hydrotherapeutic means, have failed.

Chills.

Chills, if not of a malarial type, which appear in some patients at regular intervals, should be anticipated by the patient remaining in bed and taking a hot lemonade, etc. In summer the patient should be placed out-doors during his attacks, in a sunny, windless spot.³ If the nature of the chills suggests the administration of quinine it should be given per rectum, so as not to disturb the digestive function.

Extreme
state of
weakness.

Extreme states of weakness must be treated by careful stimulation with either champagne, wine, whiskey, milk-punches, or koumiss; and, if this condition becomes chronic, digitalis, strophanthus, and caffeine are well indicated. General massage has at times also rendered me excellent services in such cases, combining with it a judicious dieting, thus imitating, in a measure, the mast cure of Weir Mitchell. Of course, all patients suffering from such attacks should be enjoined to avoid all mental and physical exertions of whatever nature.

Dyspnoea.

For acute attacks of intense dyspnoea, besides a hypodermic injection of morphine, the inhalation of oxygen, or Walton's Oxygen Compound (oxygen, 2 parts; nitrous monoxide, 1 part; ozone, 1 per cent.), seems still the best remedy, and every well-equipped sanatorium or special hospital for consumptives should have a supply of oxygen cylinders on hand.

Emphysema.

For chronic forms of emphysema and other moderate but frequent dyspnoeic conditions I have found the pneumatic cabinet

¹ Merieux (Lyons) und Niemann (Berlin), "Über Antistreptococken-Serum," "Berliner klin. Wochenschrift," No. 49, Dec. 7, 1896.

² Belfanti und Carbone, "Centralblatt für Chirurgie," Dec. 31, 1897.

³ Dettweiler, "Die Behandlung der Lungenschwindsucht," Berlin, 1884.

most valuable by letting the patient exhale in the rarefied atmosphere. To this end the patient should be made to inhale the outside air, but exhale into the rarefied atmosphere of the cabinet. With a little practice the patient will soon learn to alternate the respiratory movements and soon derive real comfort from his sojourn in the cabinet. The *modus operandi* of this inhaling from without and exhaling into the cabinet is as follows: The patient holds the nose-mask in place with his hand; he takes his first inspiration while the physician begins to manipulate the lever. During the first expiration the patient removes the nose-mask. The operator, while continuing with one hand to manipulate the lever, places the palm of his other hand tightly over the funnel of the faucet during the patient's expiratory movement, and thus there is an almost perfect occlusion, and little if any outside air can enter the cabinet. With a little practice these manipulations enable the patient to breathe with ease and comfort, and gradually he loses his distressing symptom to a considerable degree. At first, expiration through the mouth may be permitted, so as to give the patient rapid relief with the least possible exertion.

Respiratory exercises are also of great value in emphysema of the lungs. They must, however, be differently executed from those I have recommended as prophylactic and curative measures in simple pulmonary tuberculosis. There should be more abdominal breathing; instead of the inspiratory the expiratory act should be prolonged, and particular attention should be paid to the second expiratory effort. During the inspiration a considerable pressure with the palms of the hands should be exerted over the chest, and holding the breath after the inspiration should be omitted. Of course, all such patients must also be especially careful regarding overexertion. Walks taken with judgment and care on graduated paths of various inclinations are, however, to be recommended. Too long and animated conversation should be avoided. The diet of these patients should be superintended with particular care, and all such food as beans, peas, cabbage, etc., which tends to distend the intestines and push up the diaphragm, should be strictly forbidden. With emphysematous patients the so-called *suralimentation*, or overfeeding, should only be carried on gradually, since, as a rule, they feel uncomfortable when they gain flesh and adipose tissue too rapidly. Too voluminous meals are especially contraindicated. They often cause veritable distress to the patient. The

proper way of feeding this class of pulmonary invalids is in small but more frequent meals, avoiding taking too much liquid.

Insomnia.

Insomnia in tuberculous patients is an important symptom, and when confronted with it one should not rashly resort to the hypnotics of the pharmacopœia. In phthisical patients insomnia may be due to irritating cough, to pyrexia, to digestive trouble, or it may be a purely nervous manifestation. The therapeutics of fever and cough have been sufficiently dealt with in the preceding pages, and, as a dietetic means of preventing insomnia, I only desire to suggest that the patient's last meal before retiring should be light and very digestible. Tea and coffee should be strictly forbidden. As a sleep-inducing dish before retiring, buttermilk is most highly to be recommended; kephir and koumiss may take its place. The nervous insomnia of phthisical patients is less frequent in sanatoria than anywhere else, for there the open-air treatment is more systematically carried out. Nothing is more conducive to sleep than remaining out-of-doors. If the patient is able to add a moderate amount of physical exercise to his rest cure, he will be almost certain of a good night's rest. Of course, regularity in his hours of retiring and rising will be essential. Absolute quiet should, as much as possible, be assured within and in the vicinity of the consumptive's bedroom. The bed should be comfortable, not too soft, not too warm, and, of course, the room well ventilated. For the average patient the temperature of the bedroom in winter should be about 60° F. Whether to sleep on his right or left side, or on his back, is a matter of choice and habit. The only thing which I recommend my patients in this respect is to accustom themselves to sleep with as low a head-rest as possible. Feather-beds as covers should be banished from the bedroom as unsanitary.

As hydrotherapeutic means to induce sleep we must again mention the wet-pack with or without the shoulder-pieces, as described on page 254. Bathing the face with cool water or lightly sponging off the whole body is sleep-inducing. Also the vigorous friction of the feet with a rough towel soaked in cold water, or the "effleurage,"—that is to say, gentle strokes with the palm of the hand from the neck downward and over the spinal column,—may produce the desired effect. General massage should only be applied early in the morning or during the day; the same rule should hold good with the light gymnastics, which may at times be permitted in early cases. All these more or less energetic

exercises are just as much conducive to sleep, and in fact more so, when done in the morning or in the afternoon than when done in the evening; thus, the exciting effect of the exercises will have passed away by bed-time, and only the desired feeling of fatigue needed for sleep remains.

Rose,¹ in the "Zeitschrift für Krankenpflege" of July, 1898, recommends, as a physical means of producing sleep, energetic and frequently repeated opening and closing of the eyelids; but this seems to be effective only in the very mildest cases of insomnia. In the following number of the same journal, Buxbaum² recommends auto-suggestion in insomnia with all patients inclined to neurasthenia—in other words, he tells the patient not to fear insomnia, but to go to bed with the firm determination to sleep.

The medicinal hypnotics, which must be resorted to in extreme cases, are morphine and chloral. Morphine injected hypodermically, and chloral by rectum, in the smallest possible doses, will prevent digestive disturbances apt to arise from the administration of these drugs by the mouth. While I desire to repeat that sleep-producing drugs should only be administered in pulmonary tuberculosis after all physical means, single or combined, have failed, I would only apply this rule to cases where a cure or decided improvement may be looked for with reasonable certainty. Phthisical patients in the last stages of the disease, suffering from insomnia or pain, should be made comfortable even at the price of making them depend, toward the end of their lives, upon the administration of larger doses of morphine than would be advisable under ordinary circumstances.

¹ Rose, Arthur, "Über nicht-medikamentöse Schlafmittel," "Zeitschrift für Krankenpflege," vol. XX, No. 7.

² Buxbaum B., "Die Krankenpflege der Schlaflosigkeit."

CHAPTER XVIII.

LARYNGEAL TUBERCULOSIS AND INTERCURRENT DISEASES.

Laryngeal tuberculosis must be treated locally and generally. The vocal organs should be given absolute rest, and the patient should avoid all exciting occupations which will make him talk in spite of his best resolutions, and, of course, he should avoid strong winds, heavy fogs, sudden temperature changes, and all places where dust is raised or irritating odors fill the air and cause coughing spells. For such patients the selection of a warm, moist climate is recommendable (warm sea-coasts), for they really suffer in cold and dry regions. As a rule, higher altitudes are less suitable for them. The throat should be protected so as to keep that portion moderately warm. Schmidt¹ insists that the covering around the neck should always be loose.

Hygiene
and medi-
cal treat-
ment in
laryngeal
tubercu-
losis.

The diet for patients suffering from laryngeal tuberculosis need not differ materially from that prescribed for the pulmonary invalid. Of course, hard substances, such as bread-crusts and dry toast, should be avoided; also much seasoning, as through their ingestion irritation and pain may ensue. For painful deglutition, weak codeine or, better yet, cocaine application before meals should be made. A tablet of $\frac{1}{24}$ of a grain of hydrochlorate of cocaine placed on the back of the tongue is a good way of administering the cocaine, since the patient can do this himself without any danger. At times hot inhalation, with the aid of a steam atomizer, gives a decided relief. These steam sprays can be medicated according to the indication with astringent balsamic, disinfectant, or analgesic substances. A simple cold spray or the external application of cold in form of ice-cravats or cold-water compresses seems also to be beneficial in many cases. Intratracheal injections of guaiacol, menthol, and olive oil, as described on page 252, for persistent cough in pulmonary tuberculosis are well adapted to the treatment of this distressing symptom in laryngeal tuberculosis.

¹ Schmidt, M., "Die Krankheiten der oberen Luftwege," Berlin, 1894.

Aërotherapy, of course, must not be neglected in such cases. Breathing exercises should be instituted in this disease as well as in pulmonary tuberculosis. They should be taken judiciously, according to the strength of the patient. The milder the air these patients breathe, the better they will feel. My modification of the pneumatic-cabinet treatment, described on page 222, will permit the sufferer from laryngeal tuberculosis to enjoy the benefit of this valuable adjuvant in aërotherapeutics just as well as the sufferer from pulmonary consumption. By breathing through the nose with the aid of the adjustable mask instead of through the mouth-tube, the air is warmed sufficiently to cause no irritation whatsoever, and the increased air-supply thus entering the respiratory organs has its beneficial effect.

As a curative measure the lactic-acid application, varying in strength from ten to seventy-five per cent., has thus far been most universally used. The most frequent way of applying this acid is directly upon the tubercles or ulcerated surfaces. It may, however, be also injected under the mucous membrane. At times, surgical interference is inevitable, and every large institution devoted to the treatment of tuberculous patients should not be without its competent laryngologist.

The removal of tuberculous growth in the larynx by means of curettage seems to be indicated in a certain number of cases. Gleitsmann,¹ in his excellent report to the Section on Laryngology and Rhinology of the Twelfth International Medical Congress at Moscow, has promulgated the following indications and contra-indications of the curette in laryngeal tuberculosis:

Indications:

1. In cases of primary tuberculous affections without pulmonary complications.
2. In cases with circumscribed ulcerations and infiltrations of the larynx.
3. In cases with dense, hard infiltrations of the arytenoid region of the posterior wall, also of the ventricular bands and tuberculous tumors of the epiglottis.
4. In the incipient stage of pulmonary disease with but little fever and no hectic symptoms.
5. In advanced pulmonary disease with distressing dysphagia

¹ Gleitsmann, J. W., "Medical Record," Dec. 4, 1897.

resulting from infiltration of the arytenoids, as the quickest means of giving relief.

Contra-indications:

1. Advanced pulmonary disease and hectic.
2. Disseminated tuberculosis of the larynx.
3. Extensive infiltrations producing severe stenosis when tracheotomy is indicated or laryngotomy can be taken into consideration.

Gleitsmann, as well as Heryng, does not advise the operation in timid, distrustful patients lacking the necessary nerve-power, and both prefer to operate on the patient in a hospital, where he is under absolute control and the after-treatment can be carried out more satisfactorily.

For the operation of curettage various instruments have been devised, such as Krause's curettes, Gougenheim's "emporte pièce," and Heryng's rotary double curette. The last one mentioned is given the preference by Gleitsmann because it enables the operator to remove a greater amount of tissue.

Obesity in
tuberculous
patients.

Occasionally we meet a consumptive with more adipose tissue than is good for him, and in such cases a fatty degeneration of the heart is to be feared. Extreme dyspnoea and feeble heart-action are frequently the alarming symptoms. To attempt to reduce their fat by such diet as prescribed by Ebstein, Harvey, or Schweninger would be dangerous. The dieting must be done much more gradually, and, while it is essential to relieve the heart from its too fatty environment, such patients should not lose more than about two pounds in the course of one month. Moderate exercise and massage will aid in replacing the adipose tissue by muscular tissue.

Bronchitis.

Bronchitis must be treated first prophylactically by the aëro- and hydro-therapeutic measures described in the chapter on prophylactic treatment. The inhalation of impure, dusty, or irritating atmosphere is productive of bronchitis, especially in consumptives whose point of least resistance lies in the respiratory tract. An unobstructed nasal breathing is one of the essential conditions to avoid bronchial catarrhs.

The use of opium is certainly a valuable remedy to abort an attack of bronchitis. Charbonneau says a full dose of Dover's powder will frequently abort an attack. Osler is of the same opinion, saying that no remedy can take its place. English¹

¹ "Therapeutic Hints," "Medical Record," Jan. 24, 1899.

explains the therapeutic action of opium in such cases when given in full doses as follows: "Reaction of irritability, congestion, or inflammatory activity. Alteration in the character and limitation of the amount of the secretion. Increase in the general comfort by relief of pain and soreness, and removal of cough and incidental insomnia."

Counter-irritants, as mustard plasters or dry cupping, are good local remedies. The inhalation of thymol (one grain to one ounce of liquid albolene) or other antiseptic or balsamic preparations is also useful. As antipyretic in an acute bronchitis I give quinine the preference.

If the cold-pack—that is, cold-water compresser—is applied, it should be done as described on page 254 for excessive hyperhidrosis. Care should be taken in removing the compresses, so as not to have the patient take a new cold. It is prudent to remove the wet-pack under the bed-cover, and rub the chest dry with a somewhat rough towel, and follow this by a vigorous friction with alcohol. As a cough-mixture I use one of those given on page 252. Of course, any other expectorant may answer as well.

Pleurisy may manifest itself in a consumptive as a concomitant ^{Pleurisy.} or an intercurrent disease. The acute forms, arising as a new complication, must, of course, be treated by rest in bed. If there is a large exudate, absolute quiet before as well as after thoracentesis must be insisted upon. If there is but a small amount of liquid in the chest, dry cupping and mustard applications often suffice to aid absorption. Judiciously directed respiratory exercises are also of value, especially in the subacute and chronic form if there is no intense pain. To relieve the sometimes acute suffering from intercostal or pleuritic pains, cold applications are indicated; if they are not well borne warm poultices may be substituted. Of medicinal substances opiates are at times indispensable. Diuretics, such as potassium acetate, digitalis, scillæ, etc., may be indicated. The patient's strength must be kept up by tonics. Of the value of lateral douches and the respiratory exercises, to aid the absorption of fibrinous adhesion, the residual of long-standing pleuritic inflammation, we have already spoken in the respective chapters. If the pleuritic exudate becomes purulent (empyema), the case belongs to the domain of surgery. In the speedy and thorough evacuation of the pus lies the only hope for the recovery of the patient.

Pneumonia. Pneumonia, which in consumptives is usually of the lobular kind, must, when arising in the course of pulmonary phthisis, be treated as in any other patient. Rest in bed, careful antipyretic medication (quinine or lukewarm-water baths), and, above all, remedies to keep up the proper heart-action—digitalis, alcohol, etc.—are essential. Professor A. Jacobi counsels to give, from the very onset, two drops every four hours of the fluid extract of digitalis (Squibb's), thus strengthening the heart, and by its cumulative effect putting the heart in a condition of defense at the most critical stage of the disease. Counter-irritation over the whole of the chest renders also great service. The administration of ammonium carbonate and ammonium iodide will aid materially in the removal of the inflammatory products during the stage of ulceration. Professor E. G. Janeway's method of putting the pneumonia patient on a milk diet has rendered me excellent services on various occasions. In all cases the diet should be in liquid form, not too concentrated, and water should be given freely. For severe pains, carefully administered doses of morphia (hypodermically over the seat of pain) are the best analgesic.

Pneumothorax.

Pneumothorax, during the course of pulmonary tuberculosis, is most frequently the result of some sudden physical overexertion or traumatism, such as jumping, running, rapid mounting, loud singing, or a sudden blow against the chest. Again, a violent coughing spell may be the cause. It is most important to prevent such accidents. However, patients cannot always control their coughs, and a pneumothorax may occasionally develop in a consumptive without any apparent traumatic origin. As in pneumonia, rest in bed is essential. Liquid diet and stimulants of all kinds are strongly indicated. Leyden,¹ of Berlin, favors "gavage" in such cases. Locally, the cold-water compresses or ice-bags often give relief.

Pulmonary gangrene.

Pulmonary gangrene, which is one of the distressing intercurrent troubles that may appear during the course of pulmonary tuberculosis, should be treated vigorously by tonics (digitalis, caffeine, alcohol, etc.). Jaccoud recommends to give the patient from eight to ten grains of salicylic acid a day. As antiseptic inhalation a few teaspoonfuls of the essence of turpentine poured into hot water is to be recommended (Trousseau). The vapor of a

¹ Leyden, "Über Pneumothorax tuberculosis," "Deutsche medizinische Wochenschrift," 1888.

five per cent. solution of carbolic acid can also be used for the same purpose. If there are several foci, medicinal treatment is all that is possible; but if the gangrene is circumscribed and this treatment is ineffectual, pneumotomy and drainage are indicated. The part of the lung involved has been resected in some cases with satisfactory results.

Pulmonary phthisis complicated by diabetes or diabetes com-^{Diabetes.} plicated by pulmonary tuberculosis, of course, needs special attention. Von Noorden, who is to-day considered the greatest authority on diabetes, having studied the subject perhaps more thoroughly than anybody else, summarizes in the "Twentieth Century Practice of Medicine"¹ by saying, "This complication should not cause any relaxation in the carrying out of the suitable dietetic principles (of diabetes), but rather demands greater strictness and especially the greatest possible increase in the amount of fatty food, with the addition of considerable quantities of alcohol. It is advisable that the patients should reside in places where the climate is mild, rather than in those lying in high elevations, where the air is raw, and treatment in a sanatorium is preferable to a stay in one's own home or in a hotel. Certain hydrotherapeutic measures of a mild character may be cautiously instituted; diabetics with phthisis are individuals demanding the greatest protection against injurious influences." My only objection to this excellent summary would be that too considerable quantities of alcohol are not always well borne by these patients. Whenever I give alcohol, I prefer to administer it at meal-times, in the form of light white wines. The main point, in such cases, is to strive to maintain the strength of the patient by a judicious suralimentation with the exclusion of sugar, sweetmeats, pastry, preserves, sweet jellies, macaroni, peas, beans, etc. A small amount of bread and potatoes should be occasionally allowed.

While pityriasis versicolor (tinea versicolor, pityriasis of Eich-^{Pityriasis.} stedt) can hardly, in the light of modern research, be considered symptomatic of pulmonary phthisis it is, nevertheless, met with frequently enough in phthisical patients to merit some consideration here. It is most usually found in patients whose skin has not received proper hygiene. The disease is due to a vegetable parasite (microsporon furfur); the eruption is superficial, of yellowish or

¹ "Twentieth Century Practice," vol. II, "Diabetes Mellitus."

reddish color, and the itching sensation is most intense when the patient gets overheated. It is usually located over the sternum; sometimes, however, scattered over the front of the chest and the back. The edges of the patches are rounded and somewhat elevated.

The treatment consists in first removing these patches by warm baths with soap, preferably *sapo viridis*, and then applying the antiparasitic remedy. As an antiparasitic the pure ichthyol has given me much satisfaction in such cases. After having bathed the affected parts as above described I apply a good coat of the ichthyol overnight, removing it in the morning by the aid of a weak solution of bichloride (1:5000 to 1:10,000). Other applications, such as salicylic, carbol, or resorcin salves, will also rarely fail to destroy the parasite. One precaution must be insisted upon, otherwise the trouble is sure to recur: that is, the thorough boiling and disinfecting of the patient's underwear.

Miliary
tubercu-
losis.

Acute miliary tuberculosis can, in the present state of our knowledge, be treated only symptomatically. A remedy which I have seen do excellent service, and under which I observed a few apparent recoveries, is tannic acid, administered in large doses of from ten to fifteen grains three or four times daily.

Joint-tuber-
culosis.

At times, in a patient suffering from pulmonary tuberculosis, even in the earlier stages, there will be found manifestations of local tuberculosis in the joints, testicles, etc. I do not intend here to treat the subject from a surgical point of view, but only to indicate the newer methods of treatment applicable to the earlier stages of joint tuberculosis. Bier's method of treatment by local venous hyperæmia¹ I saw applied for the first time two years ago in the service of Dr. Torek, at the New York Post-Graduate Clinic, with most satisfactory results in several cases of tuberculosis of wrist and knee-joints. This method consists of ligating the member above the affected joint by an elastic band of medium width. This is done several times a day for a period varying from ten minutes to one hour at the beginning and increasing the duration of time, according to the patient's susceptibility and power to endure the pain and tickling sensation produced by the constricting band, up to four or six hours, or even a whole night. The band is applied

¹ Bier, "Heilwirkung der Hyperæmie," "Münchener med. Wochenschrift," 1897, No. 32.

only tight enough to impede the venous circulation, and if the pain becomes too intense the band must be removed. It is essential to see that the constricting band does not produce anæmia, but hyperæmia and swelling. To protect the skin it is advisable to envelop the part first by a band of linen or other soft material, and also to change the place for ligation at successive applications. The curative principle of this method seems to lie in the fact that the locally increased carbonic-acid gas, and, perhaps, also an increased phagocytosis, both attack the micro-organisms. Dr. Torek also had a case of advanced tuberculous disease of the testicle treated by the same method, with gratifying results. Of course, any tuberculous joint must, in addition to this treatment, be given as much rest as possible. I have had myself occasion to treat a few cases of early tuberculous joint-diseases in this way; but I have alternated the séances of ligation with local hot-air application by the aid of Betz's hot-air apparatus. The relief which is given to a painful tuberculous joint by Bier's application of the elastic band is almost instantaneous; in all other joint-affections the cessation of pain after this treatment is much slower, if it is at all effective. This has led some observers to make the statement that the rapid cessation of pain in a joint is a pathognomonic sign of tuberculosis.

The idea of treating tuberculosis of the joint by hot air originated with Professor Verneuil, of Paris, in 1890. The hot air is to be applied to the affected member with the usual precautions. Two layers of Turkish toweling should always be wrapped somewhat loosely around the arm or leg to be treated, and the temperature should not be higher than about 275° F. The hot-air séance can be taken twice daily, alternating with the Bier application, but the former should not last longer than an hour. Local venous hyperæmia, followed by the hot-air treatment, seems to be for the present our best therapeutic means of dealing with early tuberculous affection of the upper or lower extremities. If the joint-tuberculosis predominates over the pulmonary lesion, and especially in younger subjects, a sojourn at the sea-coast should be recommended in addition to the local treatment.

We will finally mention Hoffa's soap treatment of local tuberculous processes, a detailed description of which appeared in the "Münchener med. Wochenschrift" of February 28, 1899. Professor A. Hoffa uses the *sapo kalin. venalis transparens* of linseed-oil and liq. kal. caust., crud. without alcohol; twenty-five to forty

grams are rubbed into the skin of the back from the neck to the knees, with a sponge or the palm of the hand, two or three times a week, usually at night. The soap is washed off with a sponge and warm water after half an hour. He has treated over two hundred patients in this way in the last years with the most satisfactory results. With this general treatment Professor Hoffa combines the local treatment required. He reports most remarkable cures in cases of multiple bone and joint tuberculous processes.

Fistula
in ano.

A fistula in ano is not an infrequent occurrence in the later stage of consumption. There is still a variety of opinion as to the advisability of operating. It seems to me that if conservative treatment, such as iodoform injection and suppositories, do not suffice to cure the fistula, operative treatment should be resorted to. Especially is an operation indicated if a patient is fairly strong, but cannot walk with comfort on account of the fistula, and suffers from pain and discomfort during defecation.

All other local diseases of tuberculous nature belong to the domain of surgery, but all surgeons have learned that their local treatment is of little avail if not combined with an effective constitutional treatment and building up of the system. Good hygiene, appropriate diet, and a good condition of the respiratory organs are most essential in producing or maintaining the good result which modern surgery may accomplish in the treatment of local tuberculous lesions.

CHAPTER XIX.

EDUCATIONAL TREATMENT, PROGNOSIS, MARRIAGE, AND CHILDBIRTH.

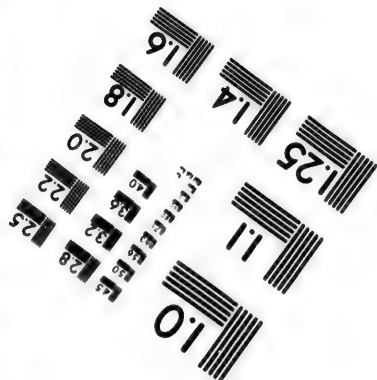
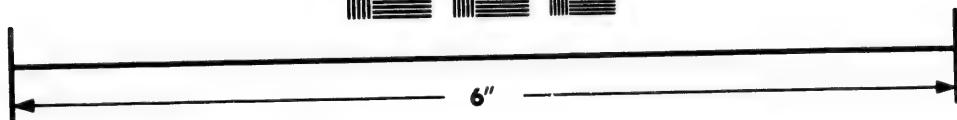
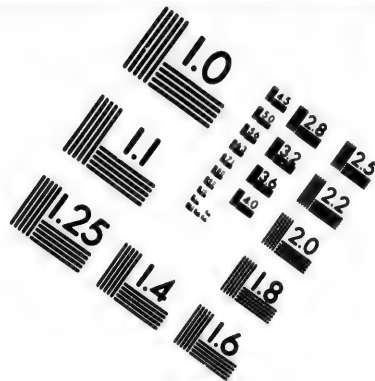
The educational treatment of tuberculous patients should, not only in the sanatorium, but everywhere, receive the attention which it deserves. To me it has always seemed as if a developing phthisis changes the patient's character and disposition often to a very considerable degree. Dettweiler thinks them all imprudent; ("ein leichtsinniges Völkchen") a careless little lot of people, he calls them. I have found many overcareful, others criminally careless, some sanguine, some morose, some indifferent, and so on.

The advantage of the institutional treatment lies, as has already been stated, in the constant medical supervision and the possibility of keeping the patient busy all day with something which has his cure for its definite object,—at this hour his meals, at that his rest cure, at this his respiratory exercises, at that his walk, at another his douche, etc., etc.

The first matter in regard to the education of a patient is, of course, the instruction concerning the care of the expectoration, of which we have spoken in detail in the preceding pages. Next in importance comes teaching him how to avoid taking cold. The most suitable mode of dress for consumptives has been briefly mentioned on pages 235 and 236. The precautions to be taken during respiratory exercises have also been touched upon. Consumptives should be particularly careful not to face the wind when taking these exercises, and, of course, always keep their mouths closed. When taking the rest cure on reclining-chairs out on the veranda, they should avoid much conversing on cold or windy days. The same rule holds good when out walking. In a sanatorium graded walks, such as described on page 213, and the distribution of numbered benches will make the method of carefully testing one's strength from day to day especially interesting. The consumptive should never start out with a determination that he must reach a certain spot. Overexertion is to be feared. The pulmonary invalid must, more than any other, be careful not to get in

Protection
against
taking
colds.





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a perspiration through exercise; he should stop before he gets tired, and learn from day to day what he can do and what he can not do. Should he, in spite of these precautions, begin to perspire freely during one of his daily walks, he should not sit down and rest to cool off, but return home at once,—however, without any increased speed,—ask to be rubbed off, and go to bed. A hot lemonade or grog is administered and the doctor notified. If the patient has perspired but slightly, he should at least enter the house after his excursion and change his under-garments. In all well-equipped sanatoria special accommodations for this purpose are established. Carrying out rigorously all the instructions concerning the prevention of taking cold will save many an inter-current bronchitis or pleuritis, or even pneumonia. Patients often take cold and the cause escapes the most careful attention until it is discovered that they are in the habit of rising at night, in the cool room, bathed in perspiration, in order to urinate. I always insist that such patients have a urinal placed near their bed, of which they can make use without uncovering themselves. Or, again, the patient takes cold by uncovering himself during the act of expectorating. As a rule, the patient raises himself for that purpose to a sitting posture, leaning over, and thus the cold air of the room strikes the whole thorax. To avoid this I tell my patients to place their pocket-flask under their pillow at night. If the necessity of its use arises, the act of expectorating in the pocket-spittoon can then be done with little inconvenience to the patients, and without there being a necessity of uncovering themselves.

Some patients have, before entering the institution or submitting themselves to treatment, acquired bad habits which are often the cause of severe colds. One of them, not common to the fair sex alone, is that of spending half an hour or more every morning in a cool bedroom, half dressed, to complete their toilet. Ladies will sometimes sit for hours scantily dressed in their cool bedrooms, just to do a little mending. All such habits must be stopped; also reading in bed at night. Patients should not leave the house before sunrise, and they should always remain within doors during the hour of sunset, especially in localities where that phenomenon is accompanied by a rapid saturation of the atmosphere (Riviera, Southern California, etc.). Tuberculous patients should have at least nine hours' sleep in the twenty-four.

Extreme nervousness is often successfully treated by a gentle sponging off with cold water. Light occupations or distractions, quiet drives not lasting too long, reading, writing, unexciting games, and music should be allowed the patient. Little writing-desks, which can be attached to the reclining-chair, such as are used in the sanatorium at Canigou, in France (Fig. 30), make reading and writing especially convenient during the rest cure in the open air, and prevent the patient from bending over. Ladies should not be allowed to do fancy work which necessitates leaning over. I make it a rule to control, in a measure, whenever it is possible, what books the patients read. Feverish patients should not read exciting literature. Quiet entertainments, musicales, and, if possible, an open-air performance; instructive lectures on hygiene in general, and especially on the hygiene of the tuberculous patients and the mode of life of the cured consumptive, etc., should form the pleasant features of sanatorium life.

The patient's tastes and inclinations, so long as they do not conflict with his own welfare or that of the other inmates of the institution, should be indulged. Large establishments should facilitate holding religious services of the various denominations, so that religiously inclined people should not miss what may be dear and needful to them. All that tends to make the patient happy and cheerful should be permitted; all that is cheerless and depressing should be banished from his surroundings. Some pulmonary invalids cannot bear the idea of entering a sanatorium; they fear the association, and others fear the discipline. From my experience as assistant physician at Falkenstein, and from many conversations which I have had with the inmates of sanatoria, who had come from all classes of society and from many different countries, I learned that each soon became so interested in his own case that he forgot all trifles, and the attention bestowed upon him by the physician and his assistants made him feel that everything in the sanatorium was done to make him comfortable and to hasten his restoration to health. This feeling predominates over all others, and the new arrival usually soon accommodates himself to his environments. Now as to that much-feared word, discipline, in sanatoria for consumptives. The whole thing consists in the goodwill and the earnest determination on the part of the patient to follow the rules of the house, which have been created in his interest, and to obey the counsel and carry out the prescriptions

Extreme
nervous-
ness.

Social life
and dis-
cipline.

of his physician ; and, on the part of the physician, a never-failing kindness, combined with an unmoved firmness when occasion demands.

Examina-
tion of
patients.

On the arrival of the patient in the sanatorium, to which he should come, if possible, with a letter from his family physician, and never without having previously been assured by the physician-in-charge that there is room for him, he is told first to rest from his journey. The next morning he will be submitted to a thorough examination of his physical condition, and, in taking down the history of the case, the observant physician will learn something of the disposition and state of mind of his new patient, and the educational treatment will begin at once. Of course, this must be in accordance with the degree of intelligence the newly arrived consumptive possesses. He is made acquainted with the rules and regulations of the house. He is instructed to be punctual at meals, and, above all, never to fear to ask counsel or advice of one of the physicians always present.

Prognosis.

The question will often arise whether a definite prognosis should be given to the friends or relatives of the patient, and whether or not he should be told his true condition. There is hardly a disease in the world of which, except in the advanced stages, it is more difficult to give a definite prognosis than in pulmonary tuberculosis. Any one who has had a number of tuberculous patients under his observation will agree with me if I say that there are cases in which, to judge from a careful physical examination, the best hopes of recovery should be held out to the patient; and still he rapidly declines and sometimes unexpectedly dies. On the other hand, not infrequently patients surprise us. Their extensive pulmonary lesions left us not the least hope, and we may have told the friends of the apparently gloomy aspect of the case; and lo! some years later, one fine day, the patient presents himself at our office, if not cured in the *ad integrum* sense, at least to all outward appearances in perfect health.

Nor can our knowledge of bacteriology aid us much in this respect. The presence of the tubercle bacilli in the sputum confirms beyond doubt the diagnosis, but not finding them at the first, second, or even the third bacteriological examination does not exclude the possibility of a tuberculous disease of the lungs. On examining sputa from advanced cases one often finds a relatively small number of bacilli in the field of the microscope, while the

examination of the expectorated product of a convalescent patient, or one with very limited pulmonary lesions, reveals sometimes enormous quantities of bacilli (No. 10, according to Gaffky's scale). This expectoration may have come from one single cough in days or weeks, and the sudden appearance of countless numbers of bacilli may have been due to the detachment of, perhaps, a very small focus of encysted tuberculous substance. The encystment of larger foci in a strong, fibrinous shell may explain the absence or very small number of bacilli in the sputa of apparently doomed patients.

I have found it good policy to be always most careful in making any positive declaration to the relatives or friends of the patient. A prognosis in a case of pulmonary phthisis does not depend only upon the condition of the patient's lungs, his power of digestion and assimilation, but it depends also upon his temperament, his social condition, and his means. I believe, in many cases, Grancher's maxim, "le pronostic de la phtisie pulmonaire commune depend en effet du malade autant et plus que de la maladie" (the prognosis of ordinary pulmonary phthisis depends in reality as much and more on the patient than on the disease), is only too true. So I think the best thing to do is to tell the patient that the chances of his recovery depend upon his obedience in carrying out the treatment prescribed for him. If he is of a particularly melancholy disposition "suggestion-therapy" will, of course, form an important factor in the management of the case. This will be especially needful when there is a consumptive family history, for I have learned how difficult it is to dissuade a patient from the preconceived idea that he has to die of consumption because some one in his family died of it.

The physician of the consumptive must be his friend and teacher at the same time. The physician's advice will and should be sought in many of the most secret family matters,—in all the subjects of sexual relation, marriage, childbirth, nursing the infant, etc.,—and it is the duty of the true modern phthisio-therapist to enlighten his patient on these vital issues, whether consulted about them especially or not.

At times a rise of temperature will be observed in spite of the patient's assurance that the physical and mental rest has been observed. The increased pyretic state may then find its explana-

Marriage
relations,
etc.

tion in an overindulgence in sexual pleasures, which a tuberculous invalid should exercise only at the rarest intervals.

Some tuberculous women suffer, at the time of their monthly period, from pulmonary congestion and hæmoptysis. To these, absolute rest, beginning three or four days before and lasting throughout the period, should be the rule. Daremberg recommends, in addition, a mustard plaster over the lower abdomen, and gives some bromide with digitalis to quiet the pulmonary condition.

As a rule, the tuberculous patient should not marry; but I have no hesitation to give my consent to marriage when the patient has been cured, or, since some authorities do not accept this word in the *ad integrum* sense, if he has remained in good health for two successive years. He should, however, be impressed with the importance of his living a quiet, regular life, free from excesses of any kind. There are times, however, when we must deviate from the iron rule not to allow a tuberculous patient to marry. If we are in the presence of a young, highly impressionable woman in the first stages of pulmonary tuberculosis, who is engaged to be married, it would be cruel and unwise to put a stop to the union: the consequent sorrow brought upon this young woman would simply mean hastening a fatal termination of her disease, while, as a happily married woman, she has a fair chance of getting well. This is one of the few instances in the practice of medicine where it becomes the duty of the physician to tell the husband that, if his wife becomes pregnant before her complete recovery, it means danger to her and to the child, and the husband should be instructed to that effect. When, nevertheless, a tuberculous woman has become pregnant, should we interfere with a view of saving the woman's life? To judge from what I have seen in the large maternity hospitals of the Old and the New World, and from my own personal experience, such procedures are, in the light of our present knowledge, no longer justified. Tarnier, Hergot, Gaulard,¹ and others have, in accidental or brought-about abortions, seen the mother's tuberculous disease take, nevertheless, the rapid course so frequently observed after an apparent improvement in cases which go to full term. During my visit

Childbirth
and nursing.

¹ "Presse médicale," Dec. 8, 1894.

to the various sanatoria, I inquired into the results obtained by the hygienic and dietetic treatment in these institutions with pregnant tuberculous women. Dettweiler, Meissen, Wolff, Roempler, Turban, and Trudeau, had observed cases where the patients did remarkably well for years after, as also did their children. Sabourin, Achtermann, and Weicker, on the other hand, had only observed an apparently much improved state before the birth of the child, followed by a rapid decline after confinement. To summarize this important question we would say: Prevent conception in a tuberculous woman; if conception has taken place, institute hygienic and dietetic treatment, preferably in a sanatorium near the home of the patient. But, as Trudeau says, it is essential that the treatment be continued for a long time afterward; and I should like to add that a repetition of pregnancy must be prevented. Never bring about abortion, for it does not save the life of the tuberculous mother.

It goes without saying that a tuberculous mother should not nurse her child. A child whose father or mother is, or has been, phthisical should be, from its very earliest age, surrounded by the best hygiene. Especial care should be given to its nutrition. A healthy wet-nurse would, of course, be the best guaranty for the child's normal development. If the procuring of a healthy foster-mother is impossible, sterilized cow's-milk, carefully diluted with boiled water, etc., must constitute the child's food.

All the precautionary measures that have been fully described in our chapter on Preventive Treatment should, if possible, be instituted. All offspring of tuberculous parents should choose out-door occupations by which to earn their livelihood, and live and work in places where they are as little as possible exposed to the inhalation of dust and other irritating substances. The cured or ameliorated patient, upon his return home, should lead a very regular life. He should avoid crowded assemblies and violent physical exercises; in short, use his experience and training in the sanatorium as a guide to keep well or to complete his cure.

To those who doubt, the physician should hold out living examples of cured tuberculous patients, which are so numerous that I do not think I exaggerate when I say that a few can be found among the patients of every general practitioner. Pulmonary tuberculosis is, indeed, one of the most curable of all diseases, but the treatment requires more attention on the part of the physician, perhaps, than

Tuberculous offspring and cured patients.

any other, for, as the preceding pages have shown, besides the great prevailing symptoms, many little ailments and causes of new disturbances arise.

Duration
of cure.

It is rarely wise to deceive a tuberculous patient as to the probable duration for his cure. Some will be able to resume their daily occupation within three months, others not before three years. It will not only depend upon the extent of the lesions produced by the tuberculous process and upon the manner in which the system responds to the treatment; but also in a measure upon the degree of hope and confidence with which the physician can inspire his patient. In looking after the patient's condition, from the most alarming symptom endangering life to the slightest cause of discomfort, and in the endeavor to remove or ameliorate them all, lies the secret of success.

Training
of physi-
cian and
nurses.

It may not be inappropriate, at the close of the chapter on Educational Treatment, to say a few words about the education of the physician. Modern phthisio-therapeutics, as carried out in well-equipped sanatoria, must be practically studied. The custom, recently instituted by Professor Curschmann, of Leipsic, and Penzoldt, of Erlangen,¹ of making excursions with their students to neighboring sanatoria as a practical demonstration of their lectures on phthisio-therapeutics, seems to me well worth imitating. There is much to be seen in such institutions which will be of value to the young practitioner. A few years ago Weber, of London, estimated that there is only room in special institutions for about one tuberculous patient in a thousand. Since then the sanatoria have multiplied, but there still remains a large percentage of tuberculous patients to be treated by the family physician; therefore, the more thorough his training in the management of so universal and complex a disease as pulmonary tuberculosis, the more will be accomplished in the line of prevention and cure.

Chronic pulmonary consumption is not an easy disease to treat. It requires not only a thorough knowledge of the etiology, pathology, and therapy, and a familiarity with all the symptoms of the disease, but also a great deal of devotion and patience, combined with great strength of character. The peculiar psychological state of nearly all phthisical patients, we repeat once more, makes it neces-

¹ Penzoldt und Stintzing, "Handbuch der Therapie der Erkrankungen der Atmungs- und Kreislaufsorgane," Jena, 1898.

sary for the true phthisio-therapeutist, not only to be to his patient a devoted physician, but also his best and most confidential friend.

Nurses who undertake to help the physician in his care of the consumptive invalid should be physically strong and of a cheerful disposition, and especially prepared for this kind of work. A nurses' training school might advantageously be attached to some of the larger sanatoria. There exists already one at the Loomis Sanitarium at Liberty, which does excellent work in preparing young women for the special duties required as nurses to patients afflicted with tuberculous diseases.

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CHAPTER XX.

TUBERCULIN, OTHER CULTURE PRODUCTS, SERUMS, ETC., IN THE TREATMENT OF PULMONARY TUBERCULOSIS.

We will now say a few words in relation to culture products. Foremost, of course, stands the tuberculin, of which the first mention to the medical world was made by Robert Koch at the International Medical Congress in 1890. The results obtained with Koch's first tuberculin, when employed for a curative purpose, have been almost universally at least deeply disappointing, if not disastrous. Its diagnostic value cannot be disputed, and in the lower animals it has given, as such, definite and useful results. The wisdom of its use for diagnostic purposes in the human race I, for one, dare to question. Five, or even ten, milligrams of tuberculin may in nine hundred and ninety-nine cases do nothing but reveal a latent tuberculosis; but in the thousandth case it may cause an unexpected generalization with a fatal result. When one has witnessed such a generalization his desire to use tuberculin for diagnostic purposes in the human race is diminished. A drug or any other substance which, when introduced into the system, is capable of bringing about a sudden rise of temperature, sometimes as much as four degrees above the normal, and which, through the circulation, will reach the tuberculous deposits, if such are present, irritating these latent tubercles into an active process of inflammation, must be considered a dangerous thing. Ambler,¹ of Asheville, in an article upon the early diagnosis of pulmonary tuberculosis, asks whether any physician would be willing to risk the consequences of such a method of diagnosing a disease; and, addressing physicians directly, he says: "Do you believe you would carry out such a procedure in your own person under such possibilities? If you would not, you have no right to use it upon your patients."

¹ Ambler, "The Early Diagnosis of Pulmonary Tuberculosis," "N. Y. Med. Journal," Feb. 12, 1898.

If I find myself in the presence of a case of suspected pulmonary tuberculosis, and repeated careful auscultations of the patient's chest, and a number of bacteriological examinations, and even an examination by the X-rays cannot confirm the suspicion, I institute the educational, hygienic, and dietetic treatment for a few months, certain that it will do an enfeebled organism a great deal of good. It may prevent a very latent tuberculosis from ever developing or fortify a predisposed individual against the invasion of the tubercle bacilli.

In some sanatoria (Adirondacks, Dr. Trudeau; Davos, Dr. Turban) and in some special hospitals small doses of tuberculin, much smaller than formerly recommended by Koch, are continually used as a curative means, and good success reported, especially in the early cases. But may we not ascribe these good results just as much to the hygienic, dietetic, and symptomatic treatment so rigorously adhered to in these institutions, where such good results were obtained before tuberculin was ever used? There are also numerous general practitioners, and among them such men as Whittaker,¹ of Cincinnati; Spengler,² of Davos; Barton,³ of New York, who still believe in the curative power of this culture-product. But do not these distinguished practitioners also in their private practice, as well as in hospital practice, insist upon the very best hygiene and diet for their tuberculous patients?

Specialists in cutaneous diseases have reported cases in which tuberculin has favorably modified the growth of lupus, and others where the injections did not stop the growth.

What has just been said of Koch's first tuberculin as a curative agent we may say of all its modifications. The tuberculocidin and its child, the antiphthisin of Klebs; the tuberculinum purificatum of von Ruck, Whitman's purified tuberculin, Hirschfelder's oxytuberculin, Koch's new tuberculin R (though the latter has already been withdrawn from the market by its manufacturers), etc.—all, in the hands of some experimenters, have produced satisfactory results. I do not wish to speak of their respective merits, but from what I have seen, heard, and read, I may summarize

¹ Whittaker, "General Impressions from Six Years' Use of the Old Tuberculin," "Journal Amer. Med. Assoc.," Nov. 6, 1897.

² Spengler, "Deutsche med. Wochenschrift," No. 36, 1897.

³ Barton, "The Scientific Treatment of Tuberculosis," "Medical Record," September, 1897.

their reported curative effects by saying of them collectively: Whenever a new culture-product is discovered, and through experiments on the guinea-pigs is shown to have a specific anti-tuberculous action, it is usually recommended with the following restrictions:

Not to be applied in advanced cases.

Not to be applied in mixed infections.

Not to use it as exclusive remedy, but always in connection with the best of hygiene and the best of diet.

Not to neglect the symptomatic treatment.

And the results of the treatment read about as follows:

A large percentage of incipient cases were cured.

A small percentage of advanced cases were benefited.

A still smaller percentage remained indifferent to the treatment.

A very small percentage died.

Cannot any one, private practitioner or sanatorium physician, report just as good and even better results whenever the hygienic, dietetic, symptomatic, and educational treatment has been carried out conscientiously without the aid of any specific or antibacillary remedies?

Of the serum of Maragliano, Paquin, and others, we can only say the same, though I am glad to acknowledge that I have not yet seen any real ill effect from their employment in tuberculosis. I cannot say this of tuberculin.

Of Brunet's "suc pulmonaire"¹ (lung-juice), we know as yet too little to express an opinion. His claims are based on Brown-Séquard's theory of the utilization of organic extracts as therapeutic agents.

Lastly, we desire to allude to the treatment by inhalation of "formalina," recently instituted by Professor Cervello, of Palermo. Formalina is said to be a powerful antiseptic gas, expensive and difficult to obtain. No opportunity has been offered yet to try the remedy in this country; but the good results reported by Professor Cervello justify mentioning this new therapeutical agent in phthisis.

Whether or not other bacterio-therapeutists will offer us that long-hoped-for remedy which will cure tuberculosis with a degree

¹ Brunet, F., "Le Suc Pulmonaire (Effets physiologiques et thérapeutiques)," Bordeaux, Imprimerie Y. Cadoret.

of certainty, so that the name specific may be justified, I am not prepared to say. But it seems to me difficult to believe that we will ever have a serum or tuberculin which, in a few weeks, even with numerous injections, will be able to produce enough fibrous connective tissue to strangle countless tubercles which it took years to form, or to create enough phagocytic blood-corpuscles to swallow myriads of bacilli. We may employ serotherapy in acute exasperation, due to an association of microbes, but to heal a tuberculous lesion we must produce new tissue, new and better blood. How this may best be done I have endeavored to outline in the preceding pages. Even should the future give us a bactericidal substance strong enough to annihilate, without hurting the patient, all the tubercle bacilli which may have invaded him, to build up his much weakened system, to protect him from intercurrent diseases and possible relapses, the hygienic and dietetic treatment in sanatoria or under good medical supervision, and in a fairly good climate, where the extremes of temperature are not too pronounced and the air free from pathogenic organisms or irritating substances, will still remain the only rational method.

CHAPTER XXI.

CONSUMPTIVES IN HEALTH RESORTS, SPORTS, ETC.

We have outlined in the preceding chapters what constitutes a careful treatment of tuberculous patients in a closed establishment under the constant supervision of the medical attendant. Can the same conditions be realized in an open health resort? In some instances, yes; in the majority of cases, however, I have no hesitation to answer emphatically, "no."

In our American resorts, such as Southern California, Florida, etc., the tuberculous invalid is perhaps less bent on pleasure than the consumptive visitor to the European health resorts, but he is more inclined to business. How often (in Southern California) have I observed the newly arrived guest, after a few weeks' sojourn, plunge himself into business, especially exciting real estate and other speculations!

In health resorts, no matter how beautiful the climate, if the patients are at liberty to do as they please, I affirm that all attempts at an effective cure are an illusion. In the great health resorts of the Riviera I have seen any number of consumptives promenading in the close, dusty air of the casinos gambling, smoking, expectorating everywhere. At the *table d'hôte* they usually eat little, or that which is not good for them. Now and then they consult a physician, whose directions they carry out only so far as does not incommode them. Sometimes they do not even go to see a doctor, but have some of the countless prescriptions filled of which they have brought a supply from home. After a while, feeling no better, they leave, disgusted with the climate that has done them no good, and blame the physician who sent them there.

In the next resort the same thing is repeated, or they go to the mountains for a change. In some cases, by the change of climate and out-door life, they really get better. They will then feel themselves privileged to make long excursions, climb mountains, or (in winter) skate, ride toboggans, or race on snowshoes. How dangerous such sports are for the phthisical patient, even if on the road to recovery, is well known.

Especially bad for pulmonary invalids have always seemed to me the sports which demand frequent stooping down, such as croquet, bowling, etc. Bicycling is now quite frequently indulged in in health resorts by tuberculous patients in the earlier stages, and especially by those as yet only predisposed. Many physicians recommend it as the best means of preventing the outbreak of tuberculosis in the predisposed individual. Now, while fully realizing its valuable therapeutic effects in many other diseases, I consider the bicycle ill-adapted either to the cure or the prevention of pulmonary tuberculosis. There are two great dangers connected with the use of the bicycle for any one whose lungs are already affected or in danger of becoming so. One is the tendency to overdo, the other the danger of taking cold. The excess of muscular exertion results in an unhealthful waste of tissue which, in the tuberculous individual, is replaced with more difficulty than in others. Bouchard, of Paris, has repeatedly demonstrated that an excess of waste-products renders an individual more liable to succumb to infectious diseases, especially tuberculosis. Persons predisposed to this disease often have a rather feeble heart-action, and such are, of course, in great danger if they put too much strain upon the heart. Mendelsohn¹ cites several cases of sudden death from this cause. The bent-over attitude is especially injurious to pulmonary invalids. Any one who has practised cycling himself must acknowledge how easily and imperceptibly one overtaxes his powers, and how almost unawares one gets in a profuse perspiration. One is then liable to become quickly chilled when stopping to rest or cool off, or if obliged to stop to fix something about the wheel. Herein lies the second danger to persons who have reason to be especially careful to avoid nasal and bronchial catarrhs, which, in the consumptive or the predisposed, have such an unfortunate tendency to descend into the deeper air-passages. Lastly, the nervous strain which all novices undergo while learning to ride I cannot help considering injurious to a relatively weakened or weak constitution. If cycling must be done, I consider the tricycle or four-wheeled vehicle propelled by some easily managed motor, as recommended by Gihon,² the safer machine for the pulmonary invalid.

¹ Mendelsohn, "Deutsche med. Wochenschrift," April 30 and June 18, 1896.

² Gihon, "The Bicycle in its Sanitary Aspect," "New York Medical Record," Oct. 3, 1896.

As I stated above, I think a strict supervision of the phthisical patient is almost impossible in an open health resort. Unless the patient is exceptionally situated and very prudent, he has little chance to be benefited in such a place. If, on the other hand, the patient is a convalescent, and has been taught how he should live, with a view to getting well, by his physician or in the sanatorium, the health resort may well offer him an opportunity to complete his cure.

Frémy,¹ considers these open health resorts also good places for the scrofulous and the predisposed to consumption; but it seems to me essential that any one, even if only predisposed to tuberculosis, should always subject himself to the guidance of a physician in an open resort as well as at home. Many an intercurrent trouble may thereby be avoided.

That in open health resorts, in spite of endeavors on the part of the municipal authorities, one is not free from the danger of contracting a tuberculous disease, and that there is much chance of reinfection, I have shown by the reports kindly sent to me by Drs. Ballestre and Atkins, and which I reproduced on page 37. If we compare these reports with those from Goerbersdorf and Falkenstein (see page 311), which show not only the absolute freedom from danger, but the real sanitary advantages, we will see how much safer and better places are the latter to go to to be cured from a pulmonary disease. I am sorry to say that in some of our resorts here in the United States similar conditions prevail to those of Europe. Recent personal inquiries in some of the boarding places in the Adirondacks, where consumptives congregate, outside of the jurisdiction of the sanatoria, revealed to me the fact that these places constitute not infrequently veritable centres of infection. In some States, much frequented by tuberculous patients, there exists a popular feeling that with the influx of pulmonary invalids there is a danger of consumption becoming "endemic." In California, for example, an attempt has been made to restrict the immigration of consumptives into that State by legislative procedures. This Draconian endeavor to settle the question of prophylaxis of tuberculosis did not have any success, and justly so. Education, judiciously and strictly enforced laws, and the multiple creation of sanatoria, especially for the poorer classes, will achieve more good and do no harm.

¹ Frémy, Communication au Congrès de la Tuberculose, Paris, 1888.

In the interest of all it is to be hoped that the sanitary authorities of all so-called health resorts for consumptives will soon succeed in enforcing such laws as will make of these places what their name implies—resorts for health-seeking people, where there will be no danger of reinfection or chance of contracting a new disease. Then the convalescent or incipient tuberculous patient may go to these resorts, place himself under the care of an experienced phthisio-therapist (and there are many in most of these places in Europe, as well as in the United States), and complete his cure under the guidance of his new medical adviser.

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CHAPTER XXII.

THE TREATMENT OF CONSUMPTIVES IN SPECIAL HOSPITALS.

The special hospital serves its most useful purpose by gathering in and caring for advanced cases, or receiving others from which the most suitable for sanatorium treatment could be selected. The treatment *per se* in a special hospital for consumptives need not, and, of course, should not, differ materially from that instituted in a sanatorium, which has been dealt with in detail in the preceding pages. But, since the special hospital is situated in or near a city, in it much that can be had with ease in the country sanatorium can only be obtained with difficulty.

The first requisite for the special hospital is a location as quiet as possible. The building should be erected on high, porous ground, and, of course, in accordance with the modern conception of hygiene and sanitation. While many of the patients will perhaps be in bed most of the time, there should, nevertheless, be plenty of verandas and balconies, wide enough to hold beds or couches, which can be placed on them on warm days with their inmates. In a city hospital for consumptives it will be well-nigh impossible to have a separate room for each patient, but too large wards also have their disadvantage. Large rooms for from four to six patients, with a number of single ones for special cases, seem the best arrangement for such an institution. The temperature throughout the hospital should rarely be higher than 65° F., and, as much as possible, uniform throughout the establishment. In winter as well as in summer the atmosphere of the rooms must be frequently renewed by opening the windows, or by ventilators. It seems to me that, what has been recently instituted by Unterberger¹ in the Military Hospital of Zarskoje Sselo, near St. Petersburg, would be an excellent addition to the equipment of a special hospital. Pine-trees, planted in tubs of wet sand, are placed

¹ Unterberger, "Ueber Scrophulose, Tuberkulose und Phthisis und die Behandlung in Haus-Sanatorien," St. Petersburg, 1897.

throughout the hospital, more numerous in the bedrooms and sitting-rooms. Toward evening, when the odor of the pine grows weak, the trees are sprayed with the following solution:

R. Ol. pini silv. (Scotch fir),	10.0
Ol. terebinthin. pur.,	30.0
Aq. font.,	300.0

Through this combination the air becomes more impregnated with ozone, and for a consumptive to live and take frequent respiratory exercises in such an atmosphere is certainly beneficial.¹

One or more pneumatic cabinets should also belong to the equipment of an institution destined to treat pulmonary diseases.

In the special hospital, where the majority of tuberculous patients are in the advanced stages, and where they will probably remain until they die, special precautions must be taken in view of the sometimes utter helplessness of these patients. All that has been said concerning the expectorations and other secretions in chapter IV applies to special hospitals as well as to the sanatorium. Fränkel's mask, as a protection against the expulsion of bacilli, should be worn, whenever practicable, in the wards (see page 44). As additional precaution in a city hospital for consumptives I would suggest, besides the disinfection of the patient's clothing and the supplying of others in the meantime (a practice now in vogue in all well-regulated hospitals), a special hygiene for the protection against reinfection and the possible transmission of their disease to the hospital attendants. It should be the duty of the nurse in charge to make the rounds at stated intervals among the patients assigned to her or his care, not only for the purpose of looking after their wants, but to see that they have not, owing to their feebleness or carelessness, expectorated where the sputum may constitute a danger. No person should be employed in the city special hospital for consumptives without being of a strong constitution and free from hereditary predisposition to tuberculous diseases. A careful physical examination by the chief of the respective service should determine whether or not the applicant may be

¹ Richet and Hericourt had three dogs, previously inoculated with tuberculosis, inhale turpentine vapors for an hour every four or five days, with the result that two were still alive, nine months later, while the control animals all died in about thirty-five days. Henocque thinks there is a decided therapeutic value in the ozone generated in turpentine vapors.—Paris Soc. de Biologie, Nov. 12, 1898.

admitted to nurse tuberculous patients. Should any of the nurses feel ill they should report at once to the physician. If their illness is of a serious character and not tuberculous, they should, of course, be treated somewhere else, since where there are many consumptives in the last stages there may remain, in spite of all precautions, some danger of infection. When suffering from colds the nurses should not be allowed to attend to their service. I still remember with gratitude that, in my early student days in Paris, Professor Debove made it a rule not to allow any student with a coryza or bronchitis to enter the tuberculous wards, the atmosphere of which he knew, in those days, to be laden with micro-organisms of all kinds, and especially with the tubercle bacilli.

Physicians and nurses, before entering upon their rounds and duties among the patients of a special hospital for consumptives, should put on long linen coats, and should wash their hands before and after leaving the wards.

CHAPTER XXIII.

THE TREATMENT OF AMBULANT TUBERCULOUS PATIENTS IN PRIVATE AND DISPENSARY PRACTICE.

There cannot be much difference in the treatment and management of the tuberculous patient able to come to the physician's office or to the dispensary. The instructions given to one are applicable to the other. The dispensary situated in the city, attached to the reception hospital or existing independently of it, is a most important institution for helping to solve the problem of dealing with the consumptive poor who are not sick enough to enter a special hospital or sanatorium. In the Lung Department of the New York Throat and Nose Hospital I had the satisfaction to see how much good can be accomplished by a well-regulated dispensary service devoted exclusively to the treatment of these unfortunates. I emphasize the word *treatment*, and I mean thereby not only administering medicine, but teaching them the hygienic and dietetic principles which their cases demand.

Since it is often impossible for the ambulant tuberculous patient to present himself daily at the office or at the dispensary, as many of this class of patients are able or obliged to work, it is well to provide them with printed instructions. These should be written in as comprehensible and untechnical language as possible, and should not be too difficult for a patient with little or no means to carry out. It may, perhaps, not be amiss to reproduce here the instruction card which I compiled for my private practice and also for my out-door service at the New York Throat and Nose Hospital (Lung Department):

Envelope for Dispensary Use.

NEW YORK THROAT AND NOSE HOSPITAL.

OUT-DOOR DEPARTMENT.

No.

Service of Dr.

Instructions for Mr.

1. Read the inclosed instruction-leaflet carefully.
2. Keep it clean by replacing it in the envelope.
3. Bring the leaflet when you call at the dispensary.

Number of Patient, . . .

Date, Instructions for M

GENERAL ADVICE.

Be hopeful and cheerful, for your disease can be cured.

Avoid anxieties and worry as far as possible.

The best occupation for a sick person is to labor to get well.

Have at least nine hours' sleep in the twenty-four, and retire early. If you have to work during the week, and you feel as if you do not get a sufficient amount of rest, remain in bed all Sunday morning and get thoroughly rested.

Live as much as you can in the open air. Do not be afraid of cold weather; only on very windy days remain in-doors.

Remain in the sunshine as much as possible, but always protect your head; the best place to take a sun-bath is a spot sheltered from the wind (in front of the open window, when there is no garden, veranda, or flat housetop). Extend yourself on a comfortable lounge, with your head in the shade and the body bathed by the rays of the sun; remain there as long as you feel comfortable.

Take your breathing exercises as you have been directed; always breathe through the nose.

Take your walking exercises regularly, as prescribed. Never walk until you are tired, and avoid getting into perspiration.

Avoid draughts, dust, and dampness, and all places where the air is bad, such as theatres, concerts, crowded meeting-places, etc.

Keep at least one window always open in your bedroom. Night air is as good and in cities even better than day air.

Never sleep nor stay in a hot room. Have your own sleeping-room if possible, but always have your own bed, which should be freely aired during the day-time. In cold weather you may have a fire in the room, but keep the window wide enough open not to have the room warmer than 60° to 65° F.

As a rule, do not leave the house until one hour after sunrise.

Dress yourself comfortably, but not so heavily as to hinder your movements; discard chest-protectors, for they only tend to make you take cold more easily. Wear a suit of good woolen under-garments, also wear woolen socks; keep your feet dry and warm. Never go without rubbers in rainy weather.

Always expectorate in a spittoon filled partially with water, into which you have put one part of carbolic acid to twenty parts of water (five per cent. solution). When you cannot conveniently get at the stationary spittoon, use your pocket-flask. You should never be without one.

Never swallow your expectoration; never use the same handkerchief to wipe your nose which you use to wipe your mouth after having expectorated. Always cover your mouth with the latter while coughing or sneezing. Never kiss any one on the mouth.

DIRECTIONS CONCERNING FOOD, DRINK, STIMULANTS, ETC.

Live on a mixed diet—that is to say, meat, fish, vegetables (especially spinach, lentils, etc.), fresh and cooked fruit, plenty of fresh milk, fresh eggs; all sorts of easily digested fats (not pork), especially butter. Thick, nourishing soups should be taken with the principal meals. Raw, chopped beef is especially to be recommended. Whole-wheat bread, being more nourishing than white bread, is to be preferred.

Eat slowly, chew your food well, take the milk in small swallows; take but little liquid during and shortly after meals. Keep your teeth in a good condition by brushing them after each meal.

Never take any alcoholic beverages (wine, beer, or liquor) without special consent and direction of the physician. Too much sweets (sugar, pies, pastry, etc.) should also be avoided, as well as all kinds of fried food.

Do not use tobacco in any form; smoking of cigarettes is particularly injurious.

SPECIAL DIET.

.....

DIRECTIONS CONCERNING BATHS AND THE USE OF COLD WATER.

Take one short warm bath once a week, followed by a rapid sponging with cooler water and a vigorous rubbing with a rough towel.

SPECIAL DIRECTIONS FOR THE USE OF COLD WATER.

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SPECIAL DIRECTIONS FOR BREATHING EXERCISES.

Take exercise No. . . . Repeat . . . times. Every . . . hour.
 These exercises are to be taken near the open window or out-doors.

SPECIAL MEDICAL ADVICE.

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Any intercurrent trouble, such as indigestion, diarrhoea, constipation, increased cough, pain, reddish expectoration, or hemorrhage, should be at once reported to the physician. Do not, however, be alarmed if you have a hemorrhage, as it is but one of the phases of the disease, and does not lessen the chances of recovery.

A careful and obedient patient has ten times as much chance of getting well as a careless or disobedient one.

. M.D.,
Attending Physician.

Concerning the care of the expectoration, I have learned that with the ambulant patients the simpler the instructions, the greater is the likelihood of their being carried out. The following is a copy of the leaflet which accompanies the aluminum pocket-flask designed by me and illustrated on page 43:

"All expectoration—that is to say, spittle—contains germs. Some of these, especially when there is bronchial or lung trouble, are dangerous; thus it is best to be careful and gather the expectoration, of whatever nature, and destroy it before harm can be

done by it. To this end pocket sputum-flasks have been devised. They are destined, in all cases of bronchial and lung affections, to receive the expectoration or spittle, which, if not carefully gathered and destroyed, may become the cause of spreading disease to others. This method of disposing of the sputum also protects the patient himself from taking the same germs into his system again, either by inhaling dust containing particles of the dried sputum or by infecting himself locally through sores. It is not safe to use a handkerchief to spit into, since in this way an infection of the nose is possible. The pocket-flask has an hermetically closing cover, and can safely be carried in the pocket. It can be easily hidden in the folds of a handkerchief, and thus its use will not attract any attention."

INSTRUCTION FOR USE AND CLEANING THE POCKET-FLASK.

To open, take the flask in the right hand and press the thumb against the side of the projecting front spring. To close, press the cover down with the index finger.

To empty the flask, unscrew the top and pour the contents into the water-closet; or fold a newspaper into several layers, pour the contents on to this, and throw the whole at once into the fire, being careful not to spill any.

Rinse the flask in hot water and wash the hands immediately afterward. In case the washers wear out, replace them by new ones.

The pneumatic-cabinet treatment, such as described on page 220, is of especial value in office and dispensary practice. Besides its beneficial effects on the patient's general condition, which he will realize after a few séances, the psychical influence which such treatment produces on the consumptive's mind is of incalculable value in the treatment of the average dispensary patient. He sees and feels that something especial is done for him. He rapidly gains confidence in his physician, and his hopes for recovery increase. Whenever possible, the ambulant tuberculous patient should be seen at least twice weekly.

CHAPTER XXIV.

TREATMENT OF CONSUMPTIVES AT THEIR HOME.

The great majority of tuberculous patients cannot, for various reasons, be treated in either sanatorium, special hospital, or health resort; and for these their home will be the only place to seek rest and relief, and become, if possible, restored to health. To be brief, I may say that the best thing to do under such circumstances would be to imitate, as nearly as is practicable, the treatment outlined for the sanatorium patient. This will be possible if the patient is willing and socially so situated as to have at his command all the comforts and surroundings which the hygienic and dietetic treatment necessitates. But such patients are relatively few. The majority of consumptives are poor or have only moderate means. For the absolutely poor the municipal sanatorium or special hospital is the only place. For those of moderate means I will endeavor to offer a few suggestions which will make an imitation of the sanatorium treatment possible—at least, in a measure.

The largest, pleasantest, sunniest, best-ventilated room should be given up to the patient. Drafts should be avoided as far as possible, but this precaution must not be carried to extreme so as to make the patient afraid of a breath of fresh air. If the bedroom is too small to make it possible to place the bed to avoid the direct draft from the open window, a substantial screen should be used as a protection. The carpet, heavy curtains, and superfluous furniture should be removed, without, however, leaving the room cheerless. Small rugs and curtains that can be washed may be retained. All the hygienic rules laid down in our chapter on Prophylaxis, concerning precautions with the expectorations and other secretions, as well as not raising dust, should be religiously adhered to in the private home. During the day the lounge or reclining-chair should be moved near the open window, if there is no porch or balcony. In summer, or on not too cold or windy days in winter, the patient may be placed, warmly wrapped, on his

chair on the flat roof, protecting his head from the sun by an umbrella or a small, improvised tent. If there is a yard or garden, a small platform of boards may be arranged for the chair in a spot sheltered from the wind. A plain steamer-chair, padded with a quilt or blanket, will answer the purpose just as well as a costly reclining-chair. Another good and simple method of carrying out the "Liegekur," or rest cure, in the open air is the one



FIG. 75.—REST CURE AT HOME.

suggested by Dairemberg.¹ A large beach-chair of wicker-work, such as is seen in our fashionable sea-side resorts, is procured. After the seat has been removed the inner walls are lined with padding. A reclining-chair is placed with its back in the interior, and the whole arranged so that the patient is protected from the wind and sun. There the patient installs himself for the day, with

¹ Dairemberg, "Traitement de la Phtisie Pulmonaire," vol. II.

his books or writing-materials at his side, placed on a little table, on which his meals may also be served. The accompanying illustration (Fig. 75) will show how easily such an arrangement can be effected. Being light, the whole can be shifted whenever the wind changes and according to the position of the sun, so that the invalid's body may be bathed by the rays of the sun, while the head remains in the shade.

Rest cure, breathing exercises, and the amount of walking the patient may be allowed to do, should be regulated each day by the attending physician.

In our chapter on Preventive Treatment we have already spoken of the often excessively dry atmosphere in many of our

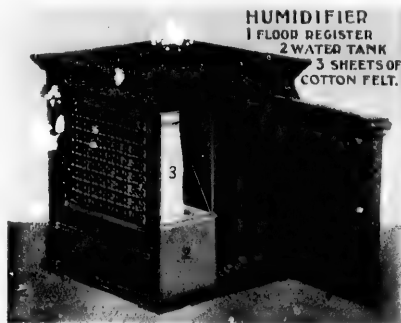


FIG. 76.

American dwellings, and ascribed to this condition the frequent occurrence of nasopharyngeal catarrhs. In the room mostly occupied by the pulmonary invalid there will be, perhaps, no need of any arrangement to combat a too great aridity, since the patient is supposed to keep the window open most of the time. But in the other rooms where he may have occasion to remain for a time, and in the interest of the health of his friends and relatives as well, the use of a humidifier will make the atmosphere less arid, and a lower temperature will suffice to render the rooms comfortable. A more humid atmosphere will especially benefit the patient if he is inclined to laryngeal trouble.

The humidifier of which I give an illustration (Fig. 76) is the invention of Dr. Henry J. Barnes, of Boston, Mass. It consists of

an outer case covering a wall or floor register, with a tank for water, over which are suspended strips of cotton felt aggregating about twelve square feet of evaporating surface. These are constantly wet through capillary attraction, and impart to the air flowing between them from one to twelve quarts of water in twenty-four hours, depending on the percentage of moisture in the air entering the case. To further illustrate the usefulness of the humidifier, I will quote from Dr. Barnes' paper, read before the American Public Health Association,¹ the following interesting passage:

"During sixteen days of last February I obtained in my office with this device a mean of 53 per cent. relative humidity, with extremes of 67° and 40° in a mean temperature of 65.3°, through the evaporation of from 2 quarts to 2 gallons of water a day, the average being 4½ quarts. During this period the outside mean temperature was 32° and relative humidity 73½ per cent., with extremes of 92° and 50°.

"I found 65° perfectly comfortable, whereas, without the artificial supply of moisture, I required from 70° to 71° temperature.

"I could have obtained a higher mean relative humidity by adding more strips to the humidifier, thus increasing the area of the evaporating surface; but this would be attended with an excessive deposit of moisture on the window-panes, either in the form of vapor or frost. Where single window-sashes are in use, the dew-point—or the saturation of the cold air near the windows, which causes the deposit of dew—takes place more abundantly than where double sashes are employed, as a consequence of the cool air being unable to hold in solution the volume of watery vapor that exists in the warmer air of other parts of the room. At zero temperature dew begins to be deposited when the air contains but .564 grains of water in a cubic foot; at 70° temperature it takes nearly sixteen times as much in a cubic foot to cause a deposit. This deposit of moisture on windows serves as a valuable guide in determining the number of sheets, or the area of evaporating surface, necessary to maintain a proper relative humidity in any particular room where artificial hydration is employed. When the required area of evaporating surface is once known, the apparatus works automatically. If the outside air supplying the furnace is comparatively warm and moist, but little water is extracted from the

¹ "The Arid Atmosphere of Our Houses in Winter," 1898.

sheets in its passage to the room; if cold and dry, it takes water from the sheets with great rapidity."

How a hydrotherapeutic arrangement can easily be improvised at home with the aid of an English bath-tub, a wooden chair, and a pitcher or watering-pot, has already been described (page 232). The friend, relative, or nurse intrusted with the care of the patient should always sleep in another bed, and, if possible, in an adjoining room. He or she alone should be responsible to the physician. All interference of well-meaning but often ill-advised friends should be strictly forbidden. Only the food and such delicacies as are ordered by the physician should enter the room. Short, pleasant visits, especially of congenial persons, will do the patient good; but all persons for whom he has a dislike, or who excite him, should be kept away as much as possible.

If the patient is too weak to leave the bed, such an arrangement with pine-trees as has been described in the chapter on Special Hospitals on page 295, will be a pleasant and useful addition to the sick-room. If, on the other hand, the patient is in the incipient state, convalescent, or strong enough to go to the physician's office, the pneumatic-cabinet treatment should, if possible, be applied daily.

As in sanatoria, so at home the pulmonary invalid should spend most of his time trying to get well. To keep him in good cheer will be the task of his companions and friends, but to see that he carries out with greatest regularity all that is required of him in regard to treatment and prevention will also become one of their important duties. Carelessness with the expectoration should never be tolerated under any circumstances; neither should the patient be allowed to indulge in anything forbidden by the physician, as, unless the latter has absolute control of all that concerns the hygienic, dietetic, and symptomatic treatment, a cure in a private home cannot be hoped for. In many cases an instruction-leaf for each day, left in the hands of the nurse, will assure a better care of the patient.

The treatment of tuberculosis in a private home by the family physician can and should be prophylactic in the broadest sense of the word. It is the family physician who will see the incipient cases first; it is he who will know or discover the predisposition to tuberculosis of any member of the family. Through a wise and judicious treatment, instituted in time, the family physician will thus cure an incipient tuberculosis, and prevent a predisposed person from acquiring the disease.

CHAPTER XXV.

SPECIAL INSTITUTIONS FOR THE CONSUMPTIVE POOR ; CARE OF CONSUMPTIVES BY THE AUTHORITIES ; THE SOCIAL PROBLEM OF TUBERCULOSIS.

We now come to the subject of special institutions, such as hospitals, sanatoria, dispensaries, etc., for the exclusive treatment of the consumptive poor.

To my mind, the multiple creation of such institutions will solve, more than anything else, the difficult problem of how to reduce the mortality from tuberculosis and prevent its spread in general. How true this is has been shown in no other country as well as in England. It is there that the idea of special hospitals and sanatoria for the consumptive poor originated. The Royal Hospital for Diseases of the Chest and the Brompton Hospital of London were the first institutions of this kind which opened their doors to the tuberculous patient without means. While the marvelous reduction of the mortality from tuberculosis in England must be in part ascribed to the generally improved sanitary condition of the country, I claim that a good deal is due to the workings of these and similar institutions now for many years in operation in England. I am indebted to Dr. Tatham, the statistical superintendent in the Registrar-General's office, for the following interesting statistics showing the reduction of mortality from phthisis pulmonalis:

The death-rate per million of the population of England and Wales from pulmonary tuberculosis—

In 1870 was	2410	In 1893 was	1468
" 1875 "	2202	" 1894 "	1385
" 1880 "	1869	" 1895 "	1398
" 1885 "	1770	" 1896 "	1307
" 1890 "	1682		

If the relatively few institutions of this kind have been instrumental in doing so much good, what might not be accomplished by multiplying these special hospitals and sanatoria for consump-

tives all over the world! That there is a great and urgent need of such establishments, especially in and near the large centres of population, no one who has any experience with the consumptive poor of any large city will dare to deny; and that the majority of general hospitals are ill-adapted to the treatment of tuberculous patients is also too well known to need repeating here. The description of the life of a poor consumptive before and after his admission into the general hospital will constitute the best plea for sanatoria for the poor.

A visit to a
tenement
home.

Let us begin by a visit to the districts in whose narrow streets, crowded with humanity, most of the poor tuberculous patients live. We make our way into a house through the little world in rags playing on the sidewalk. The hallways are dark, and the odor indicative of crowded and unclean rooms greets us. We ascend one or many flights of stairs, in the rear or in the front—it makes little difference. There lives Mr. So-and-So with his wife and several children. They occupy two rooms, rarely three; but only one receives direct light and air. And in these few rooms live, cook, eat, sleep, and often work from eight to ten human beings.

We inquire after the patient, and find him lying on a couch or bed in a dark bedroom. We examine him and find him suffering from pulmonary tuberculosis in the last stages. On examining the other members of the family we find one or two of them already "touched" by the deadly germ.

How easy it is for this infection to take place in close and unclean quarters occupied by ignorant or careless people has been already fully described.

Of the natural defense against tuberculosis, which is inherent in all robust and healthy individuals, little can be expected among the inhabitants of these tenement districts; for, alas! they are mostly underfed, and their unhygienic surroundings are ill-adapted to increase their power of resistance to disease.

Average
life of an
honest
laborer
who is
tubercu-
lous.

Let us take, for individual illustration, the case of an honest laborer who has the misfortune to become tuberculous and finally phthisical. He will at the onset seek the advice of his family physician. Presuming that a correct diagnosis has been made, the physician is likely to prescribe, with the usual remedies just then in vogue, also a few weeks of rest. This, under the most favorable circumstances, means a consumption of a part of the

savings. After a while, the patient, seemingly improved, resumes his former occupation; but the improvement is not lasting. He is again and again obliged to take a rest. The intervals between the periods of work become longer and longer. Instead of the physician, the nearest dispensary is visited, for there has been too great a drain already on the little capital put aside during better days. At last, unable to work at all, he stays at home until forced to seek admission to one of the public hospitals.

A large number of general hospitals, supported by private charity, absolutely refuse all patients suffering from tuberculosis, and it is but natural that the attending physicians of the general municipal hospitals, if not obliged to accept tuberculous cases, should also avoid crowding their wards with such patients, especially if there is a likelihood of a very prolonged stay. Thus the consumptive often obtains admission with difficulty. Finally admitted, he is placed in one of the general wards. His neighbor to the right may have typhoid fever; the one to the left, a pleurisy *à frigore*; opposite him may be a rheumatic or a fellow-consumptive. If the physician-in-charge is in favor of medication, the patient will receive the latest remedies well spoken of in the treatment of tuberculosis. If the doctor is skeptical as to the value of medication in this disease, the patient may or may not receive the special diet, and the rest is left to nature. In the morning, before the arrival of the visiting physician, the poor consumptive inhales the dust, and with it countless numbers of pathogenic microbes, raised by the attendant sweeping the ward with an ordinary broom instead of wiping the floor with a moist mop. If the patient has not yet his mixed infection he will soon get it. Instead of passing most of his time in the open air, the consumptive in our general hospitals is almost totally deprived of this essential factor in the treatment of his disease. Should he, day or night, ask to have a window open, his rheumatic neighbor would very strenuously object, for he could not stand the draught. Respiratory exercises are but rarely recommended, for the physician knows they are useless in the ordinary hospital atmosphere. At meal-times the consumptive patient eats but little. The frequent anorexia he cannot overcome, and even the special diet does not tempt him. The aërotherapeutic and hydrotherapeutic measures, so largely and beneficially resorted to in sanatoria to overcome the loss of appetite, cannot be carried out in a general hospital. At night the

Sojourn in
the general
hospital.

patient sleeps but little. He is either kept awake by his own cough or that of his neighbor. The stuffy night atmosphere of the ward furthers still more his hyperhidrosis. Thus he passes weeks, sometimes months, until a fatal termination ends his sufferings; for these patients rarely enter the hospital in time even to hope for a lasting amelioration. During this time the family, deprived of its natural supporter, is most likely to have become a public charge.

Danger to patients suffering from acute diseases.

How does the presence of the consumptive in the general hospitals affect the other patients suffering from acute diseases? Leaving aside the depressing mental effect upon these patients, we know that it is next to impossible to have such thorough hygienic and prophylactic measures in a general hospital as are characteristic of the sanatorium. Is not the patient with his pleurisy *à frigore* in great danger of having his acute infection transformed into a chronic tuberculous one? And the typhoid fever patient, with his greatly reduced power of resistance, may not he also become the prey of the bacillus tuberculosis ever present in our general hospitals?

The medical and sanitary advantages which would be obtained by the creation of municipal sanatoria for consumptives are evident, but these are not all. The patient with incipient phthisis, after a few months' practical training in the sanatorium, will have learned how to take care of his expectoration, to avoid auto-infection or the communication of his disease to others. He will have learned how to avoid the causes which may aggravate his condition, and acquired such hygienic habits as to have the best chance to become and remain entirely well.

Sanatoria as educators.

But sanatoria do not serve only as educators of individuals, but as educators of communities as well. In the villages where the two largest German sanatoria are situated, Goerbersdorf¹ and Falkenstein,² the mortality from tuberculosis has actually decreased among the village people, being now one-third less than before the establishment of these institutions. This, no doubt, is due to the example set by the inmates of the sanatoria, and it is also the best proof that well-conducted sanatoria for consumptives are not

¹ Roempler, "Beiträge zur Lehre von der chronischen Lungenschwindsucht."

² Nahm, "Münchener med. Wochenschrift," No. 40, 1895.

centres of infection, but, on the contrary, places where one is safest from contagion.¹

To uphold these statements, I will reproduce the official statistics of the village of Goerbersdorf for a hundred years:

DEATHS FROM PHTHISIS PULMONALIS.

1790-1799,	14	1840-1849,	6
1800-1809,	5	1850-1859,	7
1810-1819,	9	1860-1869,	4
1820-1829,	9	1870-1879,	5
1830-1839,	8	1880-1889,	5

Statistics proving that sanatoria are no danger to the neighborhood.

These statistics become still more valuable when one considers that the population of Goerbersdorf has doubled in the last twenty-five years.

Recently, Dr. Nahm has compiled the statistics of the village of Falkenstein. Here also the mortality from pulmonary tuberculosis has been reduced from 18.9 per cent. before the establishment of the sanatorium to 11.9 per cent. after it was opened. I will give the statistics of Falkenstein in full as they were published by Dr. Nahm:

DEATHS FROM PHTHISIS PULMONALIS.

<i>Before the Establishment of the Sanatorium.</i>	<i>After the Establishment of the Sanatorium.</i>
1856-1858, 17.2 per 100	1877-1879, 17.0 per 100
1859-1861, 7.7 "	1880-1882, 14.6 "
1862-1864, 2.6 "	1883-1885, 6.0 "
1865-1867, 14.0 "	1886-1888, 5.0 "
1868-1870, 16.7 "	1889-1891, 13.9 "
1871-1873, 21.0 "	1892-1894, 15.1 "
1874-1876, 33.3 "	

Recalling the dreadful mortality from tuberculosis in general and military hospitals, among the Sisters of Charity and the ordinary nurses, as reported by Debove, Bergeret, Lombard, Cornet, Laveran, and Kirchner,² induced me to inquire, when visiting the European sanatoria, whether any of the nurses or attendants there had ever contracted tuberculosis. I was told of one case (in Reiboldsgrün). A seemingly well young lady had entered the sanatorium as nurse and died of consumption a year later. Careful

¹ Knopf, "Are Sanatoria for Consumptives a Danger to the Neighborhood?" "N. Y. Med. Record," Oct. 3, 1896; "Revue de la Tuberculose," Paris, vol. III, pp. 313-319.

² Straus, "La tuberculose et son bacille," p. 453.

research revealed afterward that a near member of her family had died previously from tuberculosis.

During his many years of service at the Brompton Hospital, London, Dr. Williams had not seen more than three or four cases among nurses or doctors where it seemed evident that pulmonary phthisis had been contracted there. The scrupulous neatness, the excellent hygienic condition, and the thorough precautions against infection from the expectoration make it almost impossible to contract the disease in this excellent institution.

At Saranac Lake, the great American sanatorium, none of the twenty to twenty-five attendants have ever developed tuberculosis.

The daily expenses of a well-equipped special hospital or sanatorium are little if any higher than those of a general hospital, and the results obtained there are certainly much better than anywhere else with this class of patients.

Expense in
American
sanatoria.

From the statistics which I obtained I may be allowed to quote the following figures to substantiate what I have said in regard to expense in general hospitals, special hospitals, and sanatoria, and the results obtained in these respective institutions.

The daily expense at the Adirondack Sanitarium for Consumptives at Saranac Lake, reported by Dr. Trudeau, is \$1.00 to \$1.25. Patients pay, however, only \$5.00 per week, and the difference is made up by public contributions.

The daily expense, reported by Dr. Stubbart, of the Loomis Sanitarium at Liberty, N. Y., which has a most modern equipment, is \$1.43. Some patients pay \$5.00, others from \$10.00 to \$20.00, according to the location of the rooms. Like the Adirondack Sanitarium, it is also largely supported by private subscriptions.

The daily expense at the sanatorium for the consumptive poor at Ruppertshain, reported by Dr. Dettweiler, is \$0.61.

The daily expense, estimated by P. Straus, for the Municipal Sanatorium for Consumptives at Angicourt, France (in construction), will be \$0.82.

Regarding special hospitals for consumptives, I was enabled to obtain from two institutions, appertaining to the two largest cities of the United States, the following figures: At St. Joseph Hospital for Consumptives of New York the average cost per patient, reported by Dr. Cauldwell, is about fifty cents; and at the Chestnut Hill (Philadelphia) Hospital for the Consumptive Poor the average daily expense, reported by Dr. Bacon, is about forty cents.

The following figures relate to general hospitals:

COUNTRY.	REPORTED BY	HOSPITAL.	CURES.	AMELIORATIONS.	DEATHS.	AVERAGE STAY.	AVERAGE DAILY COST.
Austria, . . .	Prof. von Schrötter.	Vienna General Hospital.	0	39%	44%	35 days.	\$0.35
Baden, . . .	Prof. Bäumler.	Freiburg Medical Clinic.	0	20%	19.4%	..	1.00
England, . .	Dr. F. Parks Weber.	Guy's Hospital, London.	..	..	..	..	0.92
		Middlesex Hospital, London.	..	..	..	..	1.75
		St. George's Hospital, London.	..	..	..	..	1.52
		St. Mary's Hospital, London.	..	..	..	..	1.25
		St. Thomas' Hospital, London.	..	..	..	..	1.57
		London Hospital, London.	..	..	..	..	1.17
France, . . .	The Author.	All hospitals in Paris under the charge of the Assistance Publique.	..	..	..	..	0.66
Holland, . . .	Prof. Rosenstein.	Leyden General Hospital.	..	..	The greater part.	..	..
Italy,	Prof. Massalongo.	Verona Major Hospital.	0	..	34.03%	..	..
	Dr. Ernest de Verdi.	Milan Hospitals.	0	..	..	..	0.38
Prussia, . . .	Prof. Fürbringer.	Berlin General Hospitals.	1-2%	43.3%	47.5%	30 days.	0.65
	Prof. Mosler.	Greifswald Medical Clinic.	0	25%	13.7%	..	..
Switzerland, .	Prof. Eichhorst.	Zürich Medical Clinic.	4.6%	37.5%	35.49%	..	..
	Prof. Immermann.	Burger-Hospital, Basel.	..	50%	36%	70 days.	0.70
	Dr. Nicolas.	Neuchâtel Hospital.	0	20.1%	49.6%	..	..
United States,	Dr. J. N. Walker.	Cook County Hospital, Chicago, Ill.	0	55.5%	20.4%	..	..
	Dr. Brainerd.	Los Angeles County Hospital, Cal.	0	..	50%	145 days.	1.00
	The Author.	All the New York City hospitals under the direction of the Commission of Charities.	..	..	..	..	1.16

The results obtained in sanatoria for the tuberculous poor, or in those institutions where the patients pay only a certain proportion for their maintenance, are virtually the same as those obtained in paying institutions, the statistics of which will be found in the concluding chapter.

The Loomis Sanitarium at Liberty, N. Y., reports 25 per cent. of cures and 50 per cent. of ameliorations; 70 per cent. for early cases.

Results obtained in sanatoria for the consumptive poor.

The Adirondack Cottage Sanitarium for Consumptives at Saranac Lake, N. Y., reports 20 to 25 per cent. cures and 30 to 35 per cent. ameliorations.

The Sharon Sanitarium near Boston, Mass., reports 25 per cent. of arrested cases and a much larger percentage of improvements.

The Halila Sanatorium for the Poor, Finland, reports 36.7 per cent. of cures and 33 per cent. ameliorations.

The Falkenstein Sanatorium for the Poor, now at Ruppertsbahn, Germany, reports 13 per cent. absolute cures and 77 per cent. ameliorations.

While in the three above-mentioned American sanatoria, as a rule, only patients with incipient phthisis are admitted, at the Chestnut Hill Hospital for the Consumptive Poor, in Philadelphia, patients even in the very advanced stages are received. Still the institution could report the following results:

Discharged as cured,	8 per cent.
Improved,	11½ per cent.
Unimproved,	62½ per cent.
Died,	17½ per cent.,

and the average daily expense was only between thirty and forty cents.

Results obtained in sanatoria for tuberculous children.

It may not be uninteresting to add to the above statistics the results obtained in public sanatoria devoted exclusively to the treatment of scrofulous and tuberculous children. It seems that in the young the sanatorium treatment, especially in institutions situated on the sea-shore, is particularly successful. Here are the statistics of five institutions, four situated in France and one in Denmark.

LOCATION.	REPORTED BY	MORTALITY.	CURES.	IMPROVED.	AVERAGE STAY.
Ormesson,	Dr. Jaoul.	8.2 %	34 %	30 %	7 months.
Villiers,	" Vaquier.	8.8 %	25.5 %	34.4 %	
Forges-les-Bains, . .	" Dumenge.	. .	50 %	25 %	12 "
Arcachon,	" Lalesque.	29. %	21.7 %	45.9 %	
Refsnaes (Denmark),	" Shepelern.	. .	25 %	42.4 %	8½ "

It might not be amiss here to compare the economic advantage of early sanatorium treatment with the usual routine hospital treatment of our consumptive poor. Let us take, for illustration, a

community of 1,000,000 inhabitants. With an average death-rate of 25 per 1000, one-fifth of whom die from tuberculosis, the community would lose 5000 a year from this disease.

Some sanatoria claim as many as 70 per cent. of cures¹ when the patients are admitted to treatment in the incipient stages, and I have reason to believe that these figures are exact, for pulmonary tuberculosis in the earlier stages is, indeed, one of the most curable of all chronic diseases. But let us presume a percentage of fifty only. Thus, if these 5000 would have been placed, at the onset of their disease, under proper treatment in sanatoria, 2500 human lives would surely have been saved. Statistics have amply shown that tuberculosis is most prevalent among the poorer classes. The relation is about as 3 to 2. I believe that I am nearly right when I say that of those 5000 over 3000 at least are of the poorer classes, and of these 2000 have died most likely in public institutions.

From personal experience, gained in some of the larger general hospitals in the United States and Europe, I have learned that a tuberculous patient rarely makes a continuous stay in one hospital. He usually improves after his first sojourn and leaves, only to turn up after a few months in the same or another hospital for a second period of rest, and so on. But, all in all, the time he spends in general hospitals, to which he is usually admitted when in the advanced stage, is rarely less than fifteen months.

As above stated, the daily expense per capita in the general public hospitals of the city of New York² is \$1.16. Thus the patient costs the municipality up to his death \$522, aside of the money expended on the family of the patient, should the latter have been its only bread-winner.

The general hospitals claim few cures of pulmonary tuberculosis, and it seems almost as if this money had been uselessly spent, since a general hospital cannot even be considered a safe place for isolating a consumptive. If the same patient had, for example, been treated at the Adirondack Cottage Sanitarium or a similar institution, and been sent there at an early period of his disease, he would have had fifty per cent. more chances of recovery, and would have cost only one dollar a day, and that during a period of perhaps only from six to nine months.

¹ "Semi-annual Report of the Loomis Sanitarium for Consumptives," 1898.

² "Annual Report of the Commissioners of Public Charities and Correction of the City of New York."

Economic and social gain by timely treatment in sanatoria.

Thus, 2000 tuberculous patients treated in the general hospitals in the city of New York, with very little chance of being cured, but with much chance of doing harm to their fellow-patients suffering from acute diseases, cost the city \$1,044,000. Treated in sanatoria or special hospitals, with twenty to fifty per cent. chances of recovery, according to the stage of their disease, and even if we should allow them just as long a stay in the special institution as we grant to the advanced cases in general hospitals, the cost would be only \$890,000. Thus, with a saving of at least \$150,000, and the saving of hundreds of lives, countless centres of infection would be extinguished which otherwise would endanger the families and neighbors of these tuberculous invalids.

Besides all this, one must think of the gain to the commonwealth by restoring to health the many bread-winners whose families, under the present conditions, might become a burden to the community.

In considering the economical and social question of tuberculosis, one must also bear in mind the fact that the period of life in which consumption is most frequently contracted is between the ages of puberty and thirty. Thus, the majority of these sufferers are at an age in which they should be of the greatest use to society.

We have already referred to the sanatorium as an educator of the tuberculous individual and of the community, and as an institution where certainly much better results are obtained in the treatment of tuberculous patients than in the best equipped general city hospital. But, we repeat, the special hospital for consumptives in or near the city does great good by taking even the most advanced cases away from the poor quarters of the city.

In many of the large cities the improved sanitary conditions of the dwellings of the poor, combined with other prophylactic regulations, have, no doubt, helped to decrease the mortality from tuberculosis in a marked degree. Foremost among these cities stand London, Berlin, New York, and Philadelphia.

Results obtained by municipal prophylaxis.

What gratifying results may be obtained by energetic prophylactic work on the part of the boards of health of the great cities is shown by the very interesting report of Dr. Hermann Biggs, the director of the New York City Department of Health. In an article on the prevention and restriction of pulmonary tuberculosis, which appeared in the June "Practitioner" (London) of 1898, Dr. Biggs produced the following table, showing the decrease in the

death-rate from all tubercular diseases in New York City during the past ten years :

	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897
Death-rate, . .	4.42	4.06	3.99	3.86	3.97	3.56	3.55	3.51	3.16	3.34	3.06	2.85

But no matter how strict the prophylactic measures may be, they will not suffice to do away with the centres of infection daily created anew in the tenement districts. There must be places where tuberculous patients, no matter in what stage of their disease, can find treatment and shelter at all times.

A beautiful illustration of the value of isolation is the St. Joseph ^{Value of isolation.} Hospital for Consumptives of the city of New York, where 1500 patients, coming from among the poorest classes of the population, are received annually, most of them in the very last stages of the disease. Many lives are thus certainly saved indirectly.

But the best ultimate results in combating tuberculosis are not obtained by treating the adult when the disease has already developed, but by taking hold of the predisposed or tuberculous individual at the very earliest moment of his life. In other words, not only the prophylactic and curative treatment should begin with the child *in utero*, but also the State and municipal care.

To make my ideas on this subject clear, ideas which I have reason to believe are shared by the majority of sanitarians, I cannot do better than repeat the more essential part of what I have said in an address, delivered in August, 1898, before the Thirteenth Annual Conference of the State and Provincial Boards of Health of North America.¹

I do not desire to discuss here the prophylaxis in regard to the procreation of a tuberculous progeny; which must, according to our present conceptions of law and ethics, remain the delicate task of the family physician. The duty of the sanitarian and the government in regard to the consumptive poor commences with the care of the tuberculous mother after conception. All I may be privileged to say here is that, according to the experience of prominent obstetricians (foremost among whom I wish to mention my

¹ "State and Municipal Care of Consumptives," "New York Medical Record," Sept. 24, 1898.

two late and much regretted teachers, Professor Lusk, of New York, and Professor Tarnier, of Paris), intervention after a tuberculous conception for the purpose of cutting short the duration of gestation, and thus saving the mother's life, has proved disastrous in the majority of cases.

By proper hygiene and diet, preferably in an institution, or, at least, under the careful guidance of a physician, during a few months before and after confinement, numbers of tuberculous women and their children have been lastingly cured. Thus it seems to me the best policy for the government would be to create institutions which might, perhaps, justly be called "maternity sanatoria," where the tuberculous mother, coming from our tenement districts, should be taken at least a few months before her delivery, and should remain until some time after complete recovery from her childbed.

The beneficial effect on the woman's and child's constitutions through such an arrangement can hardly be overestimated. Leaving aside the physical well-being thus largely assured to mother and child at a period when their organisms need the most tender care, the hygienic training which the mother will have received in such an institution will be of lasting utility to herself and child, to the family, and to the community.

Maternity
sanatoria.

These maternity sanatoria need not be situated at a great distance from the city. All that would be essential is that they should be erected on good, porous ground, preferably somewhat elevated and in a locality where the atmosphere is as pure as possible. The buildings should be constructed according to the principles of modern obstetrical science and modern phthisiotherapy. The physician-in-charge should be experienced in both these branches of medicine.

The knowledge gained by the mother in the maternity sanatorium will, in all probability, suffice for her to bring up the infant as a relatively strong child and protect it from the dangers of tuberculous infection. But the inherited predisposition may still remain, and at the time the child begins to go to school the State should again make provisions. I have learned, by private inquiry, that a pregnant woman, who has the misfortune to be syphilitic or tuberculous, has great difficulty to gain admittance to maternities supported by private contributions. I know from official sources that tuberculous children are not only unwelcome

in public schools, but are not infrequently refused admittance, on the ground of being afflicted with a contagious disease. The Michigan State Board of Health recommends that persons known to be affected with tuberculosis of the lungs, or who persistently cough and expectorate, be denied the privilege of the school-room either as a teacher or a pupil. If I am not mistaken, it was in Toronto¹ that the right of the municipality to refuse a tuberculous child admission to the public school was tested for the first time before a court, and sustained on the ground of the contagious nature of the disease.

I do not wish to question the wisdom of this judgment, but I should like to know what is to become of the child, if his parents are too poor to pay for private instructions? The child cannot return to the public schools, for its disease is a chronic one and may last for years. If the municipality refuses the benefit of an education in the ordinary public schools to such a child, does it not become an imperative duty to provide special schools for tuberculous children?

Schools, however, in the ordinary sense of the word, would do but little good to such a child. In France, Belgium, and some other European countries, there have existed for years sanatoria for the treatment of tuberculous children, maintained by the municipalities. Attached to all these institutions are regularly established schools. To provide a place where tuberculous children and the children of tuberculous parents—the weaklings of the flock—shall be taken care of becomes the duty of the government. In these school-sanatoria the children will have a chance to be cured, if possible, of their disease or their predisposition, and at the same time they will receive the education which the State owes to all the children of the community. The majority of these school-sanatoria may be advantageously placed on the sea-shore, for it seems a well-established fact that the tuberculous manifestations in childhood, which are most frequently observed as joint tuberculosis or tuberculosis of the bones or of the glands, do remarkably well in marine climates.

The selection of such children for sanatorium treatment would be the task of the school physician, and one should be attached to every public school. He, seeing the children daily, in order to

¹ "Medical Week," Paris, Sept. 14, 1894.

prevent the introduction and propagation of acute diseases, will soon discern between the robust and well-nourished and the weak, dyspeptic, and not infrequently underfed pupils. These latter will, *ipso facto*, always be or become candidates for tuberculosis. If they are placed in time under good hygienic care, their chances of becoming strong and healthy citizens will be materially increased. For children suffering from pulmonary tuberculosis an institution could easily be annexed to each of the larger mountain sanatoria for consumptive adults.

From what has been said it is evident that the authorities must soon realize that something has to be done in the direction of providing for the thousands of tuberculous poor—men, women, and children—of the large centres of population.

In all civilized countries the agitation for the creation of such institutions is now most active.

Advocates
of sanatoria
for the con-
sumptive
poor.

Dettweiler,¹ Leyden,² and Liebe³ have spoken for Germany; von Schrötter⁴ for Austria; Grancher,⁵ Letulle,⁶ and Petit⁷ for France; Weber,⁸ Lindsey,⁹ and Walters¹⁰ for England; Hansen¹¹ for Norway; Saugmann¹² for Denmark; and in the United States we

¹ Dettweiler, "Mittheilungen über die erste Volksheilstätte für unbemittelte Tüppchen-krankte in Falkenstein im Taunus," "Deutsche med. Wochenschrift," 1872, 1873.

² Von Leyden, "Über die gegenwärtige Behandlung Tuberkulöser und die staatliche Fürsorge für dieselben," XII, Internationaler Congress, Moscow, August 25, 1897.

³ Liebe, Georg, "Die Bekämpfung der Tuberkulose," "Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege," 1898.

⁴ Von Schrötter, "Über den gegenwärtigen Stand der Frage der Errichtung eigener Heilstätten für die Tuberkulose," "Allgem. Wiener Med.-Zeitung," 1892.

⁵ "Rapport par M. le Prof. Grancher, Séance de l'Académie de Médecine de Paris," du 3 Mai, 1898.

⁶ Letulle, "Les Tuberculeux dans les Hôpitaux de Paris," "Presse Médicale," 1894, p. 215.

⁷ Petit, L. H., "Allocution du Secrétaire," IV. Congrès de la Tuberculose, 1898.

⁸ Weber, Hermann, "Croonian Lectures on the Hygienic and Climatic Treatment of Chronic Pulmonary Phthisis," London, 1885.

⁹ Lindsey, "Problem of the Consumptive Poor." Inaugural address. "The Lancet," London, Dec. 4, 1897.

¹⁰ Walters, "Sanatoria for Consumptive Patients," "The Practitioner," London, June, 1898.

¹¹ Hansen, Klaus, "Forslag til offentlige Foranstaltninger mod Tuberkulosen," Christiania, 1895.

¹² Saugmann, Chr., "Sanatorier for Brystsye," Copenhagen, 1897.

have in Bowditch,¹ Hamilton,² Biggs and Prudden,³ Lee,⁴ Trudeau,⁵ Flick,⁶ Hinsdale,⁷ Otis,⁸ Shrady,⁹ Rose,¹⁰ Brush,¹¹ Gibier,¹² and others,¹³ strong advocates for the establishment of State and municipal sanatoria for the care and treatment of the consumptive poor.

The crowned heads and princes of Europe, such as the Czar of Russia, the Emperor and the Empress of Germany, the Emperor of Austria, the King of Saxony, the King of Sweden, the young Queen of Holland, the Prince of Wales, and others, have placed the sanatoria for the consumptive poor under their high protection, and have opened their private purses most liberally for their support. The nobility and the aristocracy in finance, art, and literature have been eager to imitate the admirable example set by their sovereigns, and the latter, too, have given freely toward the erection and maintenance of such institutions. Thus, in the countries just mentioned a number of establishments now flourish,

¹ Bowditch, "Treatment of Phthisis in Sanatoria near our Homes," Annual Meeting of the Mass. Med. Society," June, 1896.

² Hamilton, "The Prevention of Tuberculosis," "Journal of the Amer. Med. Assoc.," June 12, 1897.

³ Biggs and Prudden, Communication to the Hon. C. G. Wilson, President of the Board of Health," Jan. 11, 1897, "N. Y. Med. Journal," Jan. 27, 1897.

⁴ Lee, Benjamin, "Present Attitude of Sanitarians and Boards of Health Toward Pulmonary Consumption." Paper read before the Section of State Medicine of the Amer. Med. Assoc., June 3, 1897.

⁵ Trudeau, "Sanatoria for the Treatment of Incipient Tuberculosis," "Medical Record," Feb. 13, 1897.

⁶ Flick, "Special Hospitals for the Treatment of Tuberculosis," "Times and Register," March 15, 1890.

⁷ Hinsdale, "Recent Measures for the Prevention and Treatment of Tuberculosis," "The Medical News," August, 1894.

⁸ Otis, "The Sanatorium or Closed Treatment of Phthisis," "N. Y. Med. Journal," June 13, 1896.

⁹ Shrady, "Medical Record," vol. LII, p. 632.

¹⁰ Rose, "Gaillard's Medical Journal," New York, 1885, vol. LX.

¹¹ Brush, Geo. W., "An Act to Establish a State Hospital for the Treatment of Incipient Pulmonary Tuberculosis." Bill before the Legislature of the State of New York, 1898.

¹² Gibier, Paul, "Proposed Hospital for Physicians Affected with Tuberculosis," March, 1897.

¹³ Mannheimer, "N. Y. med. Monatsschrift," May, 1897; Kennedy, J. F., "Iowa Health Bulletin," April, 1898.

which are doing a world of good by curing the curable tuberculous cases and taking care of the hopeless ones, thus diminishing countless centres of infection.

If a government is in earnest in its endeavor to combat tuberculosis effectually, besides its regularly enforced laws against bovine tuberculosis, its thorough hygienic and prophylactic measures against tuberculosis in man through sanitary regulations and public instruction, it must take upon itself the care and treatment of the curable and incurable cases of tuberculous patients among the poor and among those of limited means. I mean here, by limited means, a financial condition which does not permit a tuberculous patient to enter a private sanatorium or to have at home such medical, hygienic, and dietetic care as will assure him the best possible chance of recovery.

A point next to be considered would be how to recruit the patients and how to discriminate between the proper and improper cases, and thus avoid increasing the dreadful and degrading abuse of medical charity, from which physicians, and especially the general practitioners, suffer so much in these days.

Tuberculosis commissions and their duties.

Just as there exists in nearly all States or municipalities a commission or a number of special examiners for the purpose of determining who is the proper subject for State care in an asylum for the insane, so should there exist a commission for the determination of admission to a municipal or State institution for consumptives.

Such a commission, composed of a certain number of general practitioners and health officers, should be aided in its work by the charity organizations. Each and every case should be investigated by a combined committee of physicians and laymen for the following purposes:

1. To determine the applicant's condition by a medical examination.
2. To visit his home if he has been found tuberculous, and to institute such hygienic measures as seem necessary (distribution of pocket-spittoons, disinfectants, etc.).
3. To examine the other members of the family in order to find out if any of them have also contracted the disease, and, if so, to counsel proper treatment.
4. To report in full to the sanitary authorities concerning the condition of the patient's dwelling. Its renovation or even

destruction may become imperative when it is evident that tuberculosis has become "endemic" there, owing to the condition of the soil or to other sanitary defects.

5. To determine the financial condition, whether the patient is or is not able to pay, and whether or not by his being taken to an institution the family will become destitute. If the latter should be the case it would become the duty of the municipality to provide for the family. In many cases, a letter of inquiry, sent to the former medical attendant of the patient, would materially aid the work of the investigation committee.

Any individual should have the right to present himself for examination, and every physician should be at liberty to recommend any person for examination to the board of his precinct or district.

The institutions needed to carry out this plan would be :

1. A centrally located reception hospital and dispensary. The dispensary should treat the ambulant tuberculous patients, whose admission into the sanatorium is impracticable or has to be delayed for want of room. These dispensaries should also serve the patient discharged from the sanatorium as a place to seek counsel, and thus aid in his continued improvement or guard against approaching relapses.

Institution
needed to
effectually
combat
tubercu-
losis in
man.

2. One or several city sanatoria, located in the outskirts, and, if possible, in a somewhat elevated region, where the atmosphere is known to be pure. Here all patients should pass through a preparatory sojourn before being sent to the mountain sanatorium. The more advanced cases would all be retained here.

3. One or several mountain sanatoria at no greater distance from the city than three or five hours by rail, at an altitude, if possible, of between one thousand and two thousand feet, on porous ground with southern exposure, and as nearly as possible protected against the coldest winds, preferably surrounded by a pine forest. A farm in the vicinity, where the thoroughly convalescent patients can do light work, might make the institution in a measure self-supporting. To this place the selected incipient and the improved cases from the city sanatorium should be sent to complete their cure. To the mountain sanatorium there should also be attached a department for children suffering from pulmonary tuberculosis.

4. Several sea-side sanatoria for the treatment of children

afflicted with tuberculous diseases of the joints and other tuberculous (scrofulous) manifestations.

5. A maternity sanatorium. Of the requirements of such an institution I have already spoken.

By this plan it will be seen that I am in favor of treating tuberculous patients near their homes, and in the same or nearly the same climate as that in which they will have to live and work after their restoration to health. My reasons for advocating such principles are founded on the experience of all modern phthisiotherapeutists, who have demonstrated that the hygienic and dietetic treatment in closed establishments is feasible and successful in nearly all climates.

Only by adhering to these principles can we expect to cope successfully with tuberculosis—this disease of all climes, but which is most prevalent in large centres of population, where civilization has seemingly attained the highest standard.

As stated above, these institutions should be open not only to the poor, but also to those in moderate circumstances who can pay part of the expense. For this latter class of patients, many of whom for reasons of a noble feeling of independence hesitate to accept public aid, I have often wondered if a plan, something similar to the State Invalidity Insurance Companies of Germany, could not be inaugurated in this country. There, the moment an individual enters upon the career of an ordinary laborer or servant, he is obliged to be insured against sickness, accidents, and old age. If he develops tuberculosis he is immediately sent to one of the many sanatoria of that country. The government authorities, who are at the head of these State insurance companies, have long since learned that, through a timely treatment in a sanatorium, the tuberculous individual is most speedily and lastingly cured, and consequently with the least expense.

Dr. Weicker, of Goerbersdorf, to whose institution a great many of such patients are sent by the government, writes me that the percentage of cures among these is higher than among the private patients. His latest statistics give a percentage of 80 established cures with only an average of $76\frac{1}{2}$ days of sojourn in the sanatorium. This marvelous result is to be explained by the fact that the government insurance officials send their patients to the sanatorium at much earlier periods than the private physician is likely to do.

State
insurance
against
tubercu-
losis.

Thirty-seven of these government insurance companies have, according to their published figures for 1897, collectively assisted 4480 consumptives, of whom 4432 were sent to subsidized sanatoria. Nearly all these State insurance companies contribute to the funds of such establishments; some have found it to their advantage to erect special sanatoria of their own. For the year 1897 these State insurance societies of Germany invested altogether 1,300,000 marks in sanatoria for consumptives; and for 1898 a fund of between three and four million has been destined for that purpose.¹

How would it be if one of our most thickly populated States, after having created a number of sanatoria, would try the experiment of a State tuberculosis insurance company? How many families, even of the classes in fair circumstances, but in which tuberculosis is dreaded on account of the disease having been the cause of the death of some of their members, would not gladly avail themselves of this opportunity—especially since the existing life-insurance companies refuse applicants with a family history of tuberculosis? This opportunity offered by the State would mean giving to their children the certainty of being afforded the best possible chance of recovery, should they be taken down with the family disease. No matter at what age, so long as the individual remained insured, there would be the State sanatorium to receive and treat him. A payment of, for example, fifty cents a month from the birth of the child would give to the State insurance company after fifteen years, with the accrued interest, a capital of nearly one hundred and fifty dollars. By paying the aggregate amount up to the date of application, any predisposed individual might be insured at any time, and such an institution be called into life at once.

As has been stated, the greatest chance of a predisposed individual being taken sick is between the age of puberty and thirty. The chances of the disease becoming healed without ever having been discovered are between twenty and twenty-five per cent. That is to say, that out of every hundred autopsies made on people having died accidentally, or of diseases other than tuberculosis, twenty to twenty-five show evidences of healed tuberculous lesions (cicatrization or calcareous formation). The chances

¹ "Heilstätten-Korrespondenz," 1898.

of this disease being cured in from six to nine months, if it is discovered at an early period, are at least fifty per cent.

The statistical tables of the pathological and clinical proofs of the curability of pulmonary tuberculosis, on pages 32 and 329, of this work, will show that these figures are correct. It is not necessary to be an insurance expert to see that the State would hardly be a great financial loser by creating such an insurance institution. But the greatest benefit which would accrue to the State or commonwealth through such an enterprise would be the paving of the way toward a complete State or municipal control of tuberculosis among the population, which, owing to their social conditions, could otherwise not properly be cared for, and would constitute forever an impediment to the thorough prophylaxis and possible eradication of the disease.

To carry on the various State or municipal institutions to be erected, with a view to effectually stamp out tuberculosis, a large staff of competent physicians would be needed. These physicians should be paid for their labor. It is inevitable that through taking thousands of patients into such institutions the general practitioner will lose some of his income. Let the State compensate him by paying him for the service he may render in any of the institutions (sanatoria, hospitals, or special dispensaries) created by it with the view of combating tuberculosis.

To proceed with this work as soon as possible, it would be well to transform some especially favorably located general hospitals into special hospitals for consumptives; to create sanatoria for children on the sea-shore, and for adults in mountainous or at least in elevated and healthy regions.

Work for
philan-
thropists.

Here is certainly a large field in which our philanthropists can aid their State or municipality in the speedy erection of such institutions. They will thus not only help their unfortunate fellow-men suffering from consumption, but render to the community at large an incalculable service by preventing the spread of a disease to which, up to now, rich and poor, old and young have fallen victims by thousands every year. Bad food, insufficient clothing, alcoholic intemperance, excesses of all kinds, worry, anxiety, etc.,—all, of course, favor a predisposition to consumption, or hasten the development of the disease if the tuberculous germ has already implanted itself in the human system. To find a remedy for these conditions must be the work of the statesman and

social reformer, or it must come with the gradual advancement of knowledge and civilization. One evil, however, concerns statesman and sanitarian alike. This is the ever-increasing habit of cigarette-smoking. It seems to me, a law should be speedily enacted in all civilized countries to suppress, by police regulation, the smoking of cigarettes by minors.

Of the best means to overcome a predisposition to consumption, inherited or acquired, we have spoken in the chapter on Preventive Treatment.

CHAPTER XXVI.

CLINICAL EVIDENCES OF THE CURABILITY OF TUBERCULOSIS BY THE HYGIENIC AND DIETETIC TREATMENT.

CONCLUSIONS.

Since the disastrous experiences with Koch's first tuberculine I have ceased to experiment with tuberculous culture-products. But while I have watched the work of others in this line with great interest and eagerness, I have, in the meantime, thoroughly investigated the hygienic and dietetic treatment in all its aspects. A careful study of the results obtained by this method in general, and especially in institutions devoted exclusively to the treatment of pulmonary diseases, compared with those thus far obtained by the treatment with any remedy obtained from culture-products, antitubercle serum, or medical substances supposed to act directly upon the bacilli, has made me an enthusiastic advocate for such institutions, or for the same treatment outside of them in as pure an atmosphere as possible, under careful guidance of the physician.

I append here the statistics obtained in sanatoria for poor as well as for paying patients. I will first give an interesting table compiled by Manasse,¹ covering 5032 patients which passed through Brehmer's Sanatorium in Goerbersdorf, Germany, during the years 1876-1886.

STAGE OF THE DISEASE.	NUMBER OF PATIENTS.	CURED.	ALMOST CURED.	CURED AND ALMOST CURED.
I,	1390 (27.62%)	387 (27.8 %)	430 (31. %)	817 (58.5 %)
II,	2225 (44.21%)	152 (6.83%)	325 (14.6%)	477 (21.43%)
III,	1417 (28.17%)	12 (0.48%)	33 (2.3%)	45 (3.14%)
	5032	551 (11%)	788 (15.6%)	1339 (26.6%)

¹ Manasse, "Die Heilung der Lungentuberkulose in Anstalten und Kurorten."

The following statistics, with the exception of the last six numbers, were collected by myself. Nos. 18, 19, and 20 were reported by Dr. Beaulavon;¹ Nos. 21, 22, and 23 I have taken from Hohe's recent statistics.²

NAME OF SANATORIUM.	REPORTED BY	MORTALITY.	CURES.		IMPROVED.
			Absolute.	Relative.	
1. Falkenstein, Germany,	Dr. Dettweiler.	4-4.5%	14%	14%	45%
2. Hohenhof, Germany,	" Meissen.	...	14.5%	28.9%	
3. Ruppertshain, Germany,	" Nahm.	...	13%	...	77%
4. Muskoka Cottage Sanatorium, Canada,	" Elliott.	15%	16%	25%	33%
5. Sharon, Mass., U. S. A.,	" Bowditch.	...	25%		
6. Goerbersdorf Sanatorium, Germany, Brehmer,	" Achtermann.	7.51%	25%		50.55%
7. Goerbersdorf Sanatorium, Germany, Roempler,	" Roempler.	7.5%	25-27%		50%
8. Goerbersdorf Sanatorium, Germany, Pückler,	" Weicker.	4%	...		72%
9. Reiboldsgrün, Germany,	" Wolff.	2.5%	...		70.72%
10. Davos, Switzerland,	" Turban.	4.36%	30%		40%
11. Nordrach, Germany,	" Walther.	...	30%		65%
12. Halila, Finland,	" Gabrilowitch.	13.5%	36.7%		33%
13. Camigou, France,	" Sabourin.	...	43.8%		
14. Adirondack Cottage Sanatorium, U. S. A.,	" Trudeau.	...	30-35%		30-35%
15. Loomis, Liberty, N. Y.,	" Stubbert.	2%	25%		50%
16. Chestnut Hill, Pa.,	" Cohen and Bacon.	17.33%	8%		11.5%
17. Winyah, Asheville, N. C., . . .	" von Ruck.	4%	26.64%		42.47%
18. Leysin, Switzerland,	" Burnier.	17.2%	11.3%		58.2%
19. Rehburg, Germany,	" Thorspecken.	2%	40%		32%
20. Ventnor, England,	" Coghill.	8.5%	16.4%		65.4%
		Much improved.	Improved.		
21. Haufe Sanatorium, St. Blasien, .	" Sander.	17%	67%		
22. Schömberg, Germany,	" Baudach.	...	82.9%		
23. Malchow b. Berlin, Germany, .	" Reuter.	43%	40%		

I will add that the sanatoria at Ruppertshain, Malchow, Chestnut Hill, and Halila are for the poor. In the Adirondack Sanatorium, Loomis, Sharon, Muskoka, and at Ventnor the patients pay part of the expense. At the Adirondacks, Ruppertshain, and Muskoka sanatoria they do not, as a rule, admit advanced cases. At the Chestnut Hill Hospital for Consumptives (Philadelphia) all cases, no matter how far advanced, are received. To distinguish between the terms absolute and relative cure, I will give Dettweiler's definition. He calls absolutely cured the re-establishment of the normal functions of all the organs and the complete dis-

¹ Beaulavon, "Contributions a l'étude du traitement de la tuberculose pulmonaire," etc., "Thèse de Paris," 1896.

² Hohe, "Die Bekämpfung und Heilung der Lungenschwindsucht," etc., München, 1897.

appearance of the bacillus. He calls a person relatively cured when his general well-being has reappeared in spite of regular coughing spells with some expectoration in the morning.

We may ask how long these reported cures have lasted. Among 99 patients discharged from Falkenstein as cured 72 were alive and well at the time the inquiry was made, when the patients had left the sanatorium from three to nine years. In 15 cases a relapse had occurred, but 12 of these had improved again; 12 had died.¹ Dr. von Ruck, of Asheville, reported to me that he had written to 605 of his former patients who had left the sanatorium from one to three years before; 457 responded, directly or through friends. Of the , felt absolutely cured; 70 felt relatively cured; 258 felt still improved; 62 got worse or had died.

Dr. E. R. Baldwin, of Saranac Lake, reported at a recent meeting of the American Climatological Association,² that at the Adirondack Cottage Sanitarium they were in constant correspondence with 115 patients who had been discharged in the last ten or twelve years; and while a few had relapsed slightly, the majority of them were well and at their homes.

The results of all the curative treatments speak in favor of the hygienic and dietetic treatment under strict medical supervision; and, regarding prophylaxis, no measures have yet proved of any value except good sanitary laws, rigorously enforced, regarding the prevention of tuberculosis in man and beast, and the creation of sanatoria and special hospitals for the treatment, especially of the consumptive poor.

In the preceding chapter, on the Social Problem of Tuberculosis, I believe to have sufficiently demonstrated that in the end the commonwealth would be the financial gainer, even if the large staff of physicians necessary for such institutions would receive a just retribution for their labors, which are most arduous in establishments where the constant medical supervision constitutes one of the most essential parts of the treatment. When the worthy but poor consumptive is taken in time to an institution where his chances of recovery are still good, he will not

¹ Dettweiler, "Bericht über 72 seit 3-9 Jahren in Falkenstein völlig geheilte Fälle von Lungenschwindsucht," 1886.

² "New York Medical Record," vol. LV, No. 19.

have a chance to infect the other members of the family, and he is likely to return, after a relatively short sojourn, restored to health and hygienically educated, ready to become again the breadwinner of his family. Now, as already shown, the maintenance of this patient in a municipal sanatorium for from three to six months or even longer, during the earlier stage of the disease, will cost the commonwealth no more than if he had been taken to the general hospital for perhaps the same period of time, but in a much farther advanced and more hopeless state of his disease.

Even the family will be economically benefited by the removal of the consumptive to whose care much time and expense had to be devoted. How often does it not happen that, owing to the chronic sickness of one member of the family, another or sometimes two are hampered in their wage-earning capacity?

As has been shown on page 312, the daily expense of a patient in a plainly but well-equipped sanatorium for consumptives is little, if any, higher than the cost per day of a patient in a general hospital. If the family were absolutely destitute, the other members would have to be supported by the municipality, whether the head of the family were in a sanatorium or general hospital. But since, when treated in time and in a special institution, he has from twenty-five to thirty-five per cent. more chances of getting well, the likelihood of the community being obliged to support a widow and several orphans has thus also been reduced by nearly one-third.

Consumption is a social disease, and society must help the medical profession to cure it, not only in the rich, but also in the poor and poorest classes. The plan on which the second German sanatorium for consumptives was built should serve practical philanthropists as a model enterprise worthy of emulation. Some twenty-odd years ago a few wealthy citizens of the city of Frankfurt-on-the-Main united with some of the leading physicians of that city to open a sanatorium for the wealthier class of consumptives. They pledged themselves to accept no more than five per cent. on the invested capital, the annual surplus, after repairs and improvements had been made, to go toward the erection of a sanatorium for the poor. Thanks to this and some additional donations there is to-day, at Ruppertshain, near Falkenstein, one of the most flourishing sanatoria for the poor.

But, I repeat, we not only need sanatoria supported by private

beneficence, but also such as are in part or entirely maintained by the State or commonwealth, where the poor or those able to pay a moderate price can receive the best care modern phthisio-therapy can bestow upon them.

In the issue of October 30, 1897, the venerable editor of the "Medical Record," Dr. Shrady,¹ referring to the papers on tuberculosis read at the recent International Medical Congress at Moscow, recommends the establishment of special institutions in the United States for the treatment of pulmonary tuberculosis. This method of treatment, the discussion at the Congress showed, had met with so large a measure of success abroad. Concluding his excellent editorial, Dr. Shrady says: "The rational method of treating tuberculosis is, without doubt, for the sufferer to live under those conditions which fulfill, in the highest possible degree, the laws of hygiene and diet." What has been said on the subject of the treatment in these pages will show how thoroughly I am convinced of the truth of this statement.

If we wage a vigorous war on all that is unsanitary in our cities, towns, and villages; if we endeavor to raise the coming generation to be a strong people, able to resist the invasion of the pathogenic micro-organism which may escape the watchful eye of the sanitarian; if we can, by the creation of sanatoria for all classes, rich and poor, and by carrying out the hygienic, dietetic, educational, and symptomatic treatment for all consumptives outside of such institutions, cure the curable and make harmless the incurable tuberculous patients, the problem of dealing with the most widely spread of all diseases will have been solved.

What is needed to attain this end is the united working of the statesman, philanthropist, sanitarian, physician, and the good-will of an intelligent people; for, as the immortal Pasteur has said, "*It is in the power of man to cause all parasitic diseases to disappear from the world.*"

¹ "New York Medical Record," vol. LII, p. 632.

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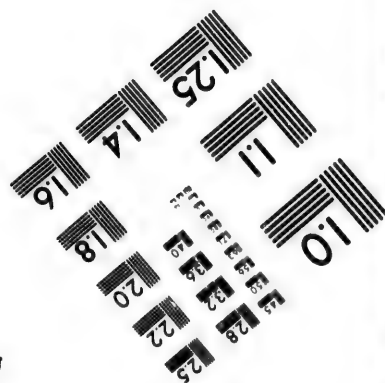
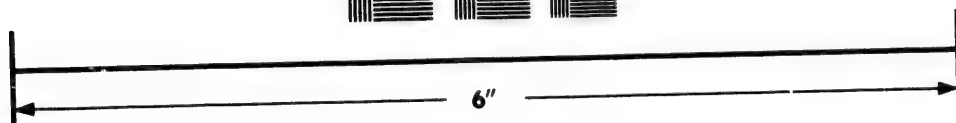
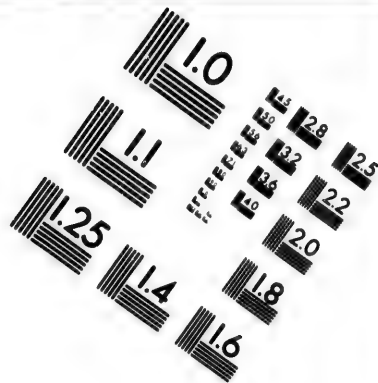
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